A DISSERTATION ON

"POST DURAL PUNCTURE HEADACHE IN LOWER LIMB AND LOWER ABDOMINAL SURGERIES – A COMPARATIVE STUDY BETWEEN 25G QUINCKE AND 25G WHITACRE SPINAL NEEDLE"

Submitted to

THE TAMILNADU DR. MGR MEDICAL UNIVERSITY, CHENNAI

for the partial fulfillment of the regulations for the award of

M.D DEGREE IN ANAESTHESIOLOGY

BRANCH-X

GOVERNMENT MOHAN KUMARAMANGALAM

MEDICAL COLLEGE, SALEM.

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I here declare that this dissertation entitled "**POST DURAL PUNCTURE HEADACHE IN LOWER LIMB AND LOWER ABDOMINAL STUDIES-A COMPARATIVE STUDY BETWEEN 25G QUINCKE AND 25G WHITACRE SPINAL NEEDLE"** is a bonafide and genuine research work carried out by me under the guidance of **Dr.K.MURUGESAN, MD, DA, Associate professor,** Department of Anaesthesiology, Govt Mohan Kumaramangalam Medical College, Salem.

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The following Members were attended the Meeting.

MEMBERS:

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1.	Dr. Lidiya George, II Year, Post Graduate Student of MD (Anaesthesiology), GMKMC, Salem-30.	"Post dural puncture headache in lower abdominal and lower limb surgeries – A comparative study of 25 G Quinke, 25 G whitacre needle".	Dr. K. Murugasen, MD., Associate Professor of Anaesthesiology, GMKMC, Salem-30.	Approved

The Ethical Committee examined the studies in detail and is pleased to accord Ethical Committee approval for the above Post Graduate student of this College to carry out the studies with the following conditions.

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POST DURAL PUNCTURE HEADACHE IN LOWERLIMB AND LOWER ABDOMINAL SURGERIES-A COMPARATIVE STUDY BETWEEN 25 G QUINCKE AND 25 G WHITACRE SPINAL NEEDLE

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LIST OF ABBREVIATIONS

PDPH	-	Post Dural Puncture Headache
CSF	-	Cerebrospinal fluid
SAB	-	Subarachnoid space
BMI	-	Body Mass Index
QB	-	Quincke Babcock's needle
DDAVP	-	Desmopressin acetate
ACTH	-	Adrenocorticotrophic Hormone
BBB	-	Blood Brain Barrier
CNS	-	Central Nervous system
RBC	-	Red Blood Cells
MRI	-	Magnetic Resonance Sonography
G	-	Gauge
GA	-	General Anaesthesia
C/C	-	Chronic
LD	-	Lethal Dose
LSCS	-	Lower Segment Caesarean Section
IV	-	Intravenous
IM	-	Intramuscular
'n'	-	Number

CONTENTS

ABSTRACT

"Post Dural Puncture Headache In Lower Limb And Lower Abdominal Surgeries – A Comparative Study Between 25G Quincke And 25G Whitacre Spinal Needle"

Background and Objective:

Post Dural Puncture Headache (PDPH) is a well recognized complication of subarachnoid block. The presence of predisposing factors such as female, young patients, low BMI, inexperience performers, pregnancy and multiple attempts increases the incidence of headache. There are various types of spinal needles used for spinal anaesthesia. The incidence of PDPH by intentional dural puncture is 0.1 to 36%. The incidence is however very less for pencil point needles like Whitacre.(3.1%) compared with traditional cutting needles. In this study we compared the the incidence and severity of postdural puncture headache of two needles, 25G Quincke and 25G Whitacre needle.

Methodology:

In this prospective randomized double blinded study, we included 100 patients between the age group 18 – 45 yrs, belonging to ASA 1 and 2 categories posted for lower abdominal and lower limb surgeries. Spinal anesthesia was performed using midline approach at L2-L3 or L3-L4 using one of the above needles and 0.5 % of 2-3ml Bupivacaine was injected and patient turned to supine position. The anaesthesiologists performing the procedure were blinded. Patients were interviewed on day 1,2,3,4 and 5 and were questioned regarding headache, its severity, location, character, duration and

associated symptoms like nausea, vomiting, auditory and ocular symptoms. The severity was assessed using a numerical analogue scale.

Results:

In a total of 100 patients 8 patients (16.5%) developed PDPH. In Quinke group there was a total of 7 patients who developed PDPH compared to that of Whitacre group, where only one patient had PDPH, which was statistically significant. The severity of headache was mild to moderate which was treated with analgesics and intravenous fluids.The incidence of headache was comparable with sex and age, with females and younger patients having higher incidence respectively.

Conclusion:

Thus we concluded that non cutting spinal needles like Whitacre have decreased incidence and severity of PDPH compared to cutting needles like Quincke.

Keywords:

Spinal Anaesthesia, Post dural puncture headache, Whitacre needle, Quinke needle.

INTRODUCTION

Post Dural Puncture Headache (PDPH) is well recognized complication of subarachnoid block. PDPH occurs following subarachnoid block because of arachnoid and dural puncture and it significally affects patients postoperative well being.

The incidence of PDPH by intentional dural puncture is 0.1 to 36% but it is 3.1% by pencil point needles such as 25G Whitacre spinal needle. The presence of predisposing factors such as female, young patients, low BMI, inexperience performers, pregnancy and multiple attempts increases the incidence of headache. Identification of factors which predisposes to headache is important to minimize this complication.

AIMS OF THE STUDY:

To compare the incidence and severity of PDPH in lower abdominal and lower limb surgeries using 25G Quincke and 25G Whitacre spinal needle.

SPINAL ANAESTHESIA:

Subarachnoid block or spinal anaesthesia is defined as a form of regional anaesthesia involving injection of local anaesthetics and other types of permissive drugs into the subarachnoid space.

First spinal anaesthesia occurred as an accident in 1885. **James Leonard Corning** first described about subarachnoid block. **August Bier** administered first planned spinal anaesthesia in 1898. He reported about the complications including back and leg pain, headache and vomiting following spinal anaesthesia.

Advantages of spinal anaesthesia include its rapid onset and effective pain relief for various procedures & also decreases morbidity following major surgeries.

INDICATIONS

1. Lower abdominal surgeries.
2. Inguinal surgeries.
3. Urogenital surgeries
4. Lower extremity surgeries.

CONTRAINDICATIONS

ABSOLUTE

1. Patients refusal
2. Bleeding diathesis
3. Severe hypovolemia
4. Elevated intracranial pressure (eg :mass lesion)
5. Infection at the site of injection
6. Severe aortic or mitral stenosis

RELATIVE

1. Sepsis
2. Left ventricular outflow tract obstruction (HOCM)
3. Preexisting neurological deficits
4. Demyelinating lesions
5. Stenotic valvular heart lesions
6. Severe vertebral anomalies

SPINAL ANATOMY

A typical vertebra is composed of two parts:

- Body or base which bears the weight.
- The arch which the surrounds the cord laterally and posteriorly consisting of lamina and pedicle.

In addition there are, seven processes :

(a)Three muscular processes –two transverse and one spinous process

(b)Four articular processes- two upper and two lower processes

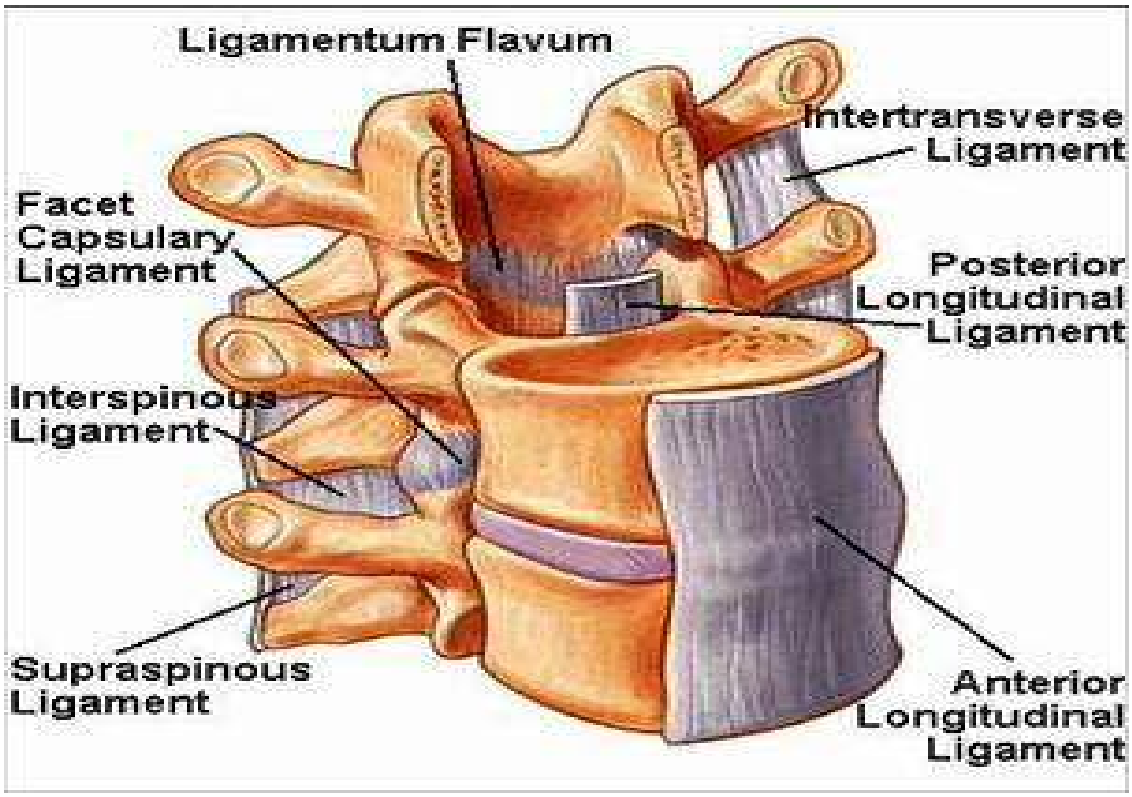
ANATOMY OF SPINAL LIGAMENTS:

SUPRASPINOUS LIGAMENT: A strong thick fibrous band connecting the apices of the spine from the 7^{th} cervical vertebra to sacrum.

INTERSPINOUS LIGAMENT: A thin fibrous structure band connecting the adjacent spines.

LIGAMENTUM FLAVUM: A yellow elastic tissue which is perpendicular in direction and extend between lamina from the antero- inferior surface of the upper lamina downward to the antero- superior surface of lower lamina.

ANATOMY OF SPINE AND LIGAMENTS



SPINAL CORD

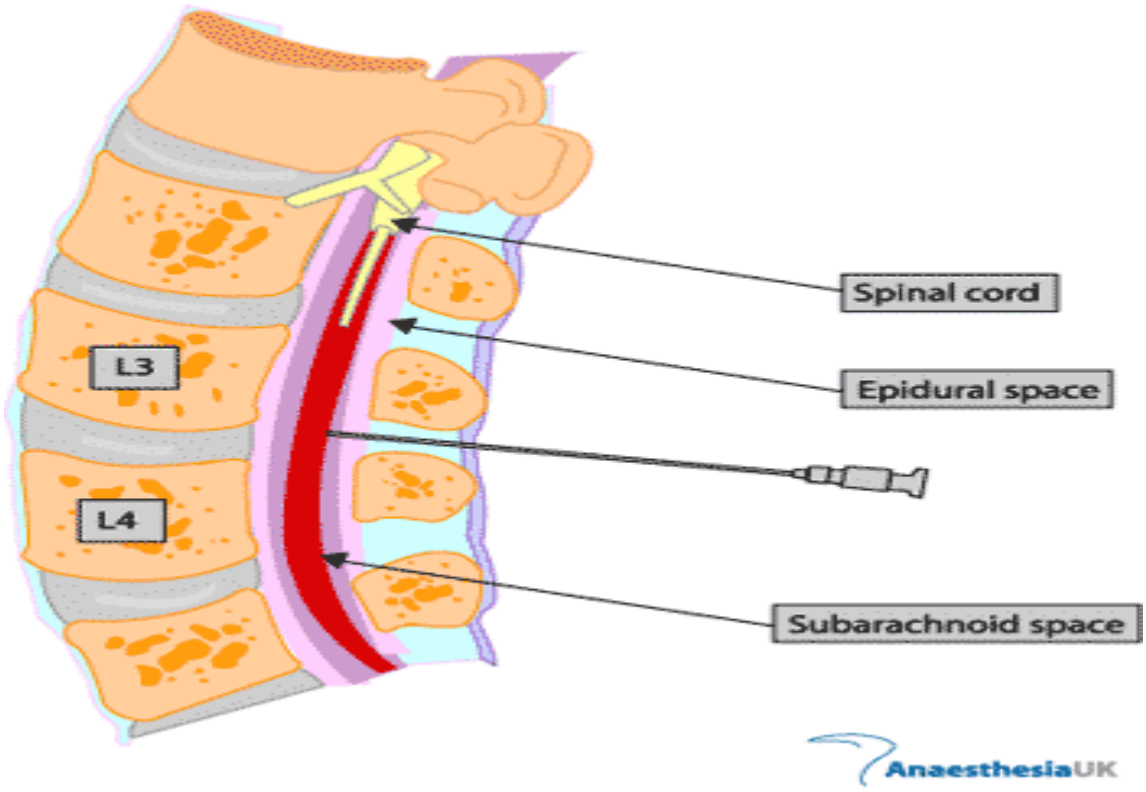
Spinal cord is tubular bundle composed of nervous tissue extending from medulla oblongata to lower lumbar vertebrae. At birth, it extends up to L-3 ,by one year reaches up to the level L-2 and reaches adult level of L-1 by 12-16 years of age.

MENINGES OF SPINAL CORD

Spinal cord is covered by three layers or covering otherwise called meninges.

1. Duramater or Outer layer
2. Arachnoid mater or Middle layer
3. Piamater or inner layer

Subarachnoid space is space between arachnoid and piamater which contains CSF. Drugs are deposited in this space to produce the desired effect in SAB. Subdural space occurs between duramater and arachnoid mater and epidural or extradural space occurs outer to duramater.



Spinal duramater extends from the foramen magnum to the 2 nd segment of sacral vertebra which has both spinal cord and the nerve roots. Duramater

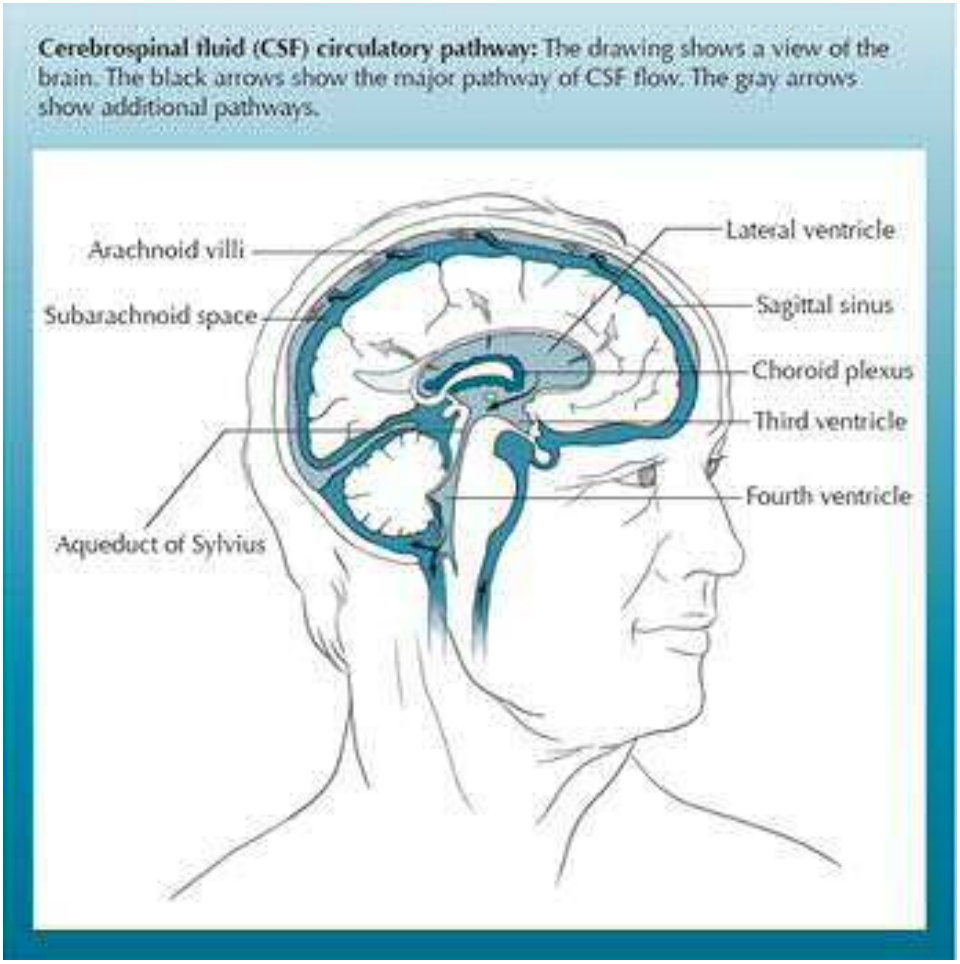
is made of connective tissue layer which consists of collagen and elastic fibres. It is described classically as a group of collagen fibres which runs in a longitudinal fashion.

Various clinical trials based on this dural view suggested that a cutting spinal needle should be oriented parallel than at right angle to the longitudinal fibres. Orientation of spinal needle at right angles to the parallel fibres will cut more fibres and the cut dural fibres which previously under tension will retract more & thereby increases the longitudinal dimension of the dural perforation and thus PDPH.

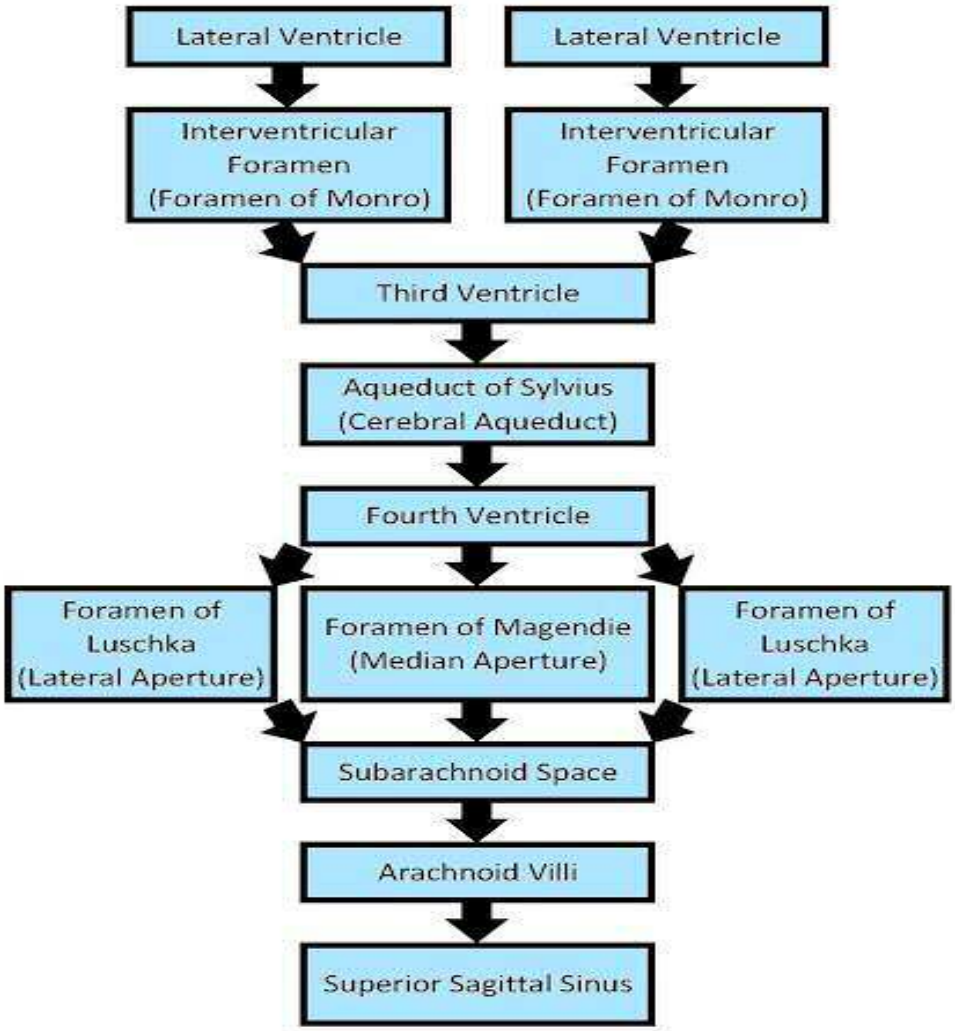
Recent studies using light and electron microscopy of human duramater have contested the classical description of the anatomy of duramater. These describes the duramater as a collection of collagen fibres arranged in several layers parallel to the surface. Each layer of lamellae consists of both collagen and elastic fibres that do not demonstrate a specific orientation. The outer or epidural surface may indeed have dural fibres arranged in longitudinal fashion and this pattern is not repeated through successive dural layers. Recent measurements on dural thickness have demonstrated that the posterior duramater varies in thickness and thickness of duramater at a particular level is not predictable within individual or between different individuals. The dural perforation in a thick area is less likely to produce CSF leak compared to a thin area and explains the unpredictable consequences of a dural perforation.

CEREBROSPINAL FLUID

CSF is produced from the choroidal plexus and also there is evidence of extrachoroidal production. Total 500 ml of CSF is secreted per day (ie.0.35 ml/min). The CSF volume in the adult is approximately 150 ml- half of these will be inside the cranial cavity. The CSF pressure measured in the lumbar region in the horizontal position is between 5-15 cm H2O and increases over to 40 cm H2O in erect posture. In children, pressure of the CSF increases with age and only be a little above few cm H2O in early life



Circulation of Cerebrospinal Fluid (CSF)



POSTDURAL PUNCTURE HEADACHE:

After effects of puncture of the spinal & cranial duramater results in leakage of CSF. Neurosurgical experience of the dural perforation showed that even minimal perforation is to be closed directly or by applying synthetic or biologic dural graft material. Failure to close these dural perforations will lead to adhesions, continuous CSF leakage & increases the risk of infection. Studies in dogs shown deliberate dural defects in the cranial duramater took almost one week to close and closure occurred by fibroblastic proliferation from the surrounding tissue and the blood clot. Therefore, a spinal needle which is carefully placed in the subarachnoid space does not promote the dural healing as the trauma to the adjacent tissue is minimal. Whereas the observation that blood promotes dural healing agrees with the Gormley's original observation that bloody taps were less likely to cause a PSPH as a consequence of a persistent CSF leak.

NEEDLE TIP DEFORMATION AND DURAL PERFORATION

As it is proposed, the needle tip deformation can occur at the time of insertion due to contact with bone. Damage of the tip of needle can lead to further increase in the size of the dural perforation. The recent in vivo studies showed that pencil type of needles are less likely to get deformed after bony contact than same size cutting type of spinal needles.

CONSEQUENCES OF THE DURAL PUNCTURE

The puncture in the duramater allows excessive leakage of CSF which leads to reduction in CSF volume. Excessive loss of CSF occurs after the development of PDPH. The presence of CSF leak is confirmed with radionuclide cisternography, epiduroscopy, radionuclide myelography, manometric studies and direct visualization at laminectomy. The subarachnoid pressure of 5 to 15 cm H2O in adults is reduced to 4 cm or less. Rate of CSF loss is greater when compared to the rate of formation (0.35ml/min), especially with spinal needle sizes more than 25 gauge. Although the loss of CSF and lowering of CSF pressure is not disputed, the actual mechanism producing headache is unclear.

There are 2 possible explanations:

1. First, lowering of the CSF pressure can produce traction on the intracranial structures in the upright position and these structures are pain sensitive leading to the characteristic headache.

2. Secondly, the loss of CSF produces a compensatory venous dilatation (Munro -Kellie doctrine). The Munro Kellie doctrine or hypothesis suggests that the sum of the volumes of the brain, CSF & intracranial blood is constant. The consequence of this decrease in CSF volume is a compensatory increase in the blood volume and this venodilatation is responsible for spinal headache.

HISTORY OF PDPH

August bier first described the symptoms of PDPH in 1899. He summarized that the headache was attributable to the loss of the CSF. By 1900, there were numerous reports about the application of spinal anesthesia using large spinal needles.

Classically, the spinal headache appears on the second or third postoperative day and consists of an occipital ache of a band-like character with some nuchal rigidity which is postural in nature, aggravated or appearing with assumption of the erect position and relieved by recumbency. There are many variables and special features of PDPH.

DIFFERENTIAL DIAGNOSIS

It is important to realize that PDPH does not occur during the period of spinal anaesthesia but occurs in the postoperative period. When headache occurs following spinal anaesthesia, other likely causes are:

1. **Coincidental Headache**: This headache when evaluated should be similar to previous headaches experienced by the patient. Secondly, it should not be influenced by posture of the patient.

2. Spinal Headache: Whenever there is a postural relationship with the headache and headache does not occur within 24-48 hours after the administration of spinal anesthesia. The following should be determined :the

time of onset, the severity, the duration and whether there is a disturbance in the patient's routine.

3. Equivocal headache: This may occur even when there is a postural relationship exist in a given headache. And one should also be careful to determine if the patient have migraine type of headache ,which would result in confusion in diagnosis.

4. Caffeine withdrawal headache: The patient who regularly consumes 200 to 400 mg/day of caffeine containing beverages are likely to suffer from an abstinence syndrome if intake is stopped. In caffeine withdrawal syndrome, the features develop within 24 hours and symptoms are typically denoted by headache, sleepiness ,inactivity and irritability.

SEVERITY; The severity of a spinal headache can be classified into three categories as follows.

1. **Mild Type**: The patient continues to be mobile and there is no significant inconvenience and treatment with adequate hydration and small doses of codeine and aspirin or other analgesics is usually sufficient. The incidence is approximately is 8%.

2. Moderately severe Type: In these, patients will have some degree of inconvenience and patient considers the headache as significant. The patient is only partially mobile and does like to recline if there is an exacerbation of the typical type of ache. The incidence of this type is approximately 3%.

3. Severe headache Type: This type of headache causes an interruption in the normal activity and the patient prefers to remain supine position. This headache is one that should be treated with blood patch, epidural injection of saline or a local anaesthetic in the epidural space.

In addition to the headache simply related to dural puncture and the escape of cerebrospinal fluid, the other two recognized features:

1. Headache (Meningismus type) results from the injection of toxic substances or contamination by cellular debris or blood producing aseptic inflammatory reaction is almost unknown at present when the standard spinal punctures are followed.
2. The introduction of organisms will produce a headache resulting from aseptic procedures are followed.

INCIDENCE

The average incidence of PDPH is 10% and is modified by several factors. **Thorsen** [1] reported an 18 % incidence in a controlled series of spinal anaesthetics using an 18 gauge Quincke needle. But 19 % incidence of headache has been reported following the diagnostic puncture alone, while with myelography the incidence is 50%. **Peluse** [2] has reviewed the literature and found that the incidence of PDPH is 25% but however following spinal anaesthesia the incidence is 3 %. **Vandam** [3,4] reported the incidence of PDPH is 11% in carefully managed series.

DESCRIPTION OF PDPH

The terms used to describe the spinal headache are:

1. **Constricting bands around the head**
2. **A Dull ache**
3. **Heaviness or heavy weight of the head**
4. **As pressure in the head**
5. **Throbbing sensation**
6. **Top blowing off**
7. **Occasionally a vacuum–like sense**

Spasms and pain in the neck muscles are often present but represent part of pattern of reaction to the pain of headache. And ocular symptoms and dizziness may accompany the headache.

ONSET AND DURATION

PDPH occurs soon after the assumption of head up position. If not severe, ambulation and movement will ameliorate the symptoms presumably by increasing the central venous pressure and thus enhancing CSF formation. Most headaches appears on the first and second postoperative day. In a carefully analyzed study by **Vandam** [5] about 75 % cases occurred by the end of third postoperative day and 85 % by the end of sixth postoperative day.

In some cases, headaches were reported 1 to 5 months later, but other inciting factors should also be suspected.

FACTORS AFFECTING THE INCIDENCE OF PDPH

1. **Relation to sex**: PDPH is much more frequent in females especially young females compared to men of same age. Incidence is twice in females compared to males undergoing same surgical procedures. The reason is women seem to process nociceptive stimuli differently from men which facilitate central sensitization process.

2. **Relation to menstruation:** A lower frequency of PDPH occurs in second part of the menstrual cycle due to higher estrogen and raising progesterone levels causing more sodium and water retension. With onset of menstruation and subsequent preovulation period, the incidence of headache is high.

3.**Relation to Age**: Increased incidence in 20-40 years age group. After fifth decade, there is a sharp decline in the incidence of PDPH due to raised pain threshold and decreased physical sensitivity (decreased vibration sense in old age).

4. **Relation to psyche**: The psychic factors are extremely important. **Watson** considered that there is a direct relationship with emotional factors and development of PDPH. In **Levin's** series [7] with incidence of 13 % lumbar tap alone and immediate ambulation with designed purpose of preventing introspection lowered the incidence of headache to 6 %.

Chronic migraine patients and headache sufferers, have increased incidence of post spinal headache, so spinal anaesthesia should be avoided in such patients.

5. **Body mass index**: Lower Body Mass Index (BMI) is associated with more risk of spinal headache. PDPH incidence is less noted more in patients with more BMI. The reason is because of large abdominal panniculus which acts as abdominal binder which increases intraabdominal pressure thus decreases the CSF leak.

6. **Hydration status**: Preloading of patients before SAB has reduced the incidence and magnitude of PDPH. Normal hydration status of the patient should be maintained. Extra hydration won't alleviate the symptoms but dehydration can make the symptoms worst.

7. **Number of puncture**: There were many reports available discussing whether multiple attempts of needle puncture increased the incidence of headache**. Lybecker** et al did not found any statistically significant difference between PDPH and number of attempts. However recent analysis of the prospective data on 8034 spinal anesthesia cases showed increased incidence of headache with repeated puncture attempts.

8. **Puncture approach**: CSF loss was more when median approach was used compared to paramedian approach. The best possible explanations for decreased CSF loss in paramedian approach is different angles of puncture in duramater and arachnoid mater acts a valve like mechanism preventing leak.

9. **Relation to the type of agent used**: The analysis by **Vandam**[5] showed no difference in incidence when procaine,tetracaine or dibucaine wereused. No evidence that lignocaine or bupivacaine affects the incidence of headache.

10. **Relation to the size of needle**: A correlation between the spinal needle size and incidence of post lumbar puncture headache has been clearly estabilished. Smaller size of the needle lesser the incidence of post dural puncture headache.

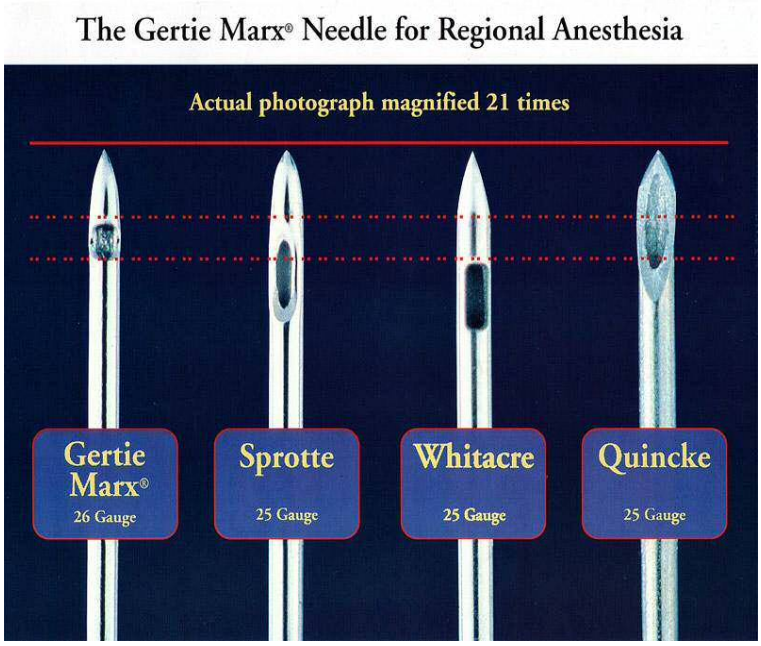
In **H. Greene**[8] in 1926 advocated the use of small gauge spinal needles and those with conical point to lessen the incidence of post dural puncture headache. At the Lahey clinic **Sise** [9] demonstrated the use of small gauge needles together with the introducer prevented post dural puncture headache.

Subsequently, in 1950 **Barnett Greene**[10] demonstrated that the incidence of headache can be reduced to 1 % when 26G needle is used for lumbar puncture. The following relationship were observed in his studies, use of a 20G needle resulted in 41% of patients, a 22G needle resulted in 8 % headache, and a 26G needle in 0.4 % incidence and hydration of patients further reduced the incidence of headache. **Dripps and Vandam**[11] in their study demonstrated the use of the 16G needle resulted in incidence of 26 % headache, but a 24G needle resulted in incidence of about 6 % further shows a relationship with the use of smaller needles. Clinical randomized controlled trials also confirm that the use of small-gauge needles reduce the incidence of PDPH.

Limitations of using smaller gauge needles size less than 26 is associated with technical difficulties and more failure rates. Needles of 24 gauges or smaller which are quite flexible and pliable so it is necessary to use an introducer or another large needle to facilitate the passage through the

intervertebral ligaments. These studies also support the leakage theory as the cause of spinal headache as the size of the needle is the dominant determinant of the size of dural holes and rate of CSF fluid leakage.

TYPES OF SPINAL NEEDLES



Two types of spinal puncture needles are available for spinal anesthesia classified according to the design of the needle point:

1) Standard beveled needle with cutting edges such as the Quincke –Babcock or Pitkin needle.

2) Pencil point needle with conical point and no cutting edges such as Whitacre and Greene conical point needle.

The design , development and the production of the spinal needle that are commonly used has been reviewed in detail by "**Pierre Lund** ". This review has a section on "needles of historical interest" which goes from corning's needle -1900 to a modified **Bier** needle which was popular in 1920.

THE STANDARD SPINAL NEEDLE:

A standard spinal needle consists of three parts The hub that is fused to the cannula with a point and with a fitted removable stylet that occludes the distal lumen and point of the cannula. The point of the cannulas are beveled and have a sharpened edge.

Lumen size: vary from 18-gauge to 26 gauge

Length: 3.5 to 4 inch

THE QUINCKE-BABCOCK NEEDLE:

- Considered as the **standard spinal needle** with a small hub and a sharp point with medium length cutting bevel.
- There is a fitted stylet with a matching beveled tip to the cannula point.
- Reusable forms of this needle are available.

THE PITKIN NEEDLE:

- Another **cutting type** of spinal needle.
- Features of this small hub with a luer-lok connector with a very sharp point bevel and Bevel is with cutting edges and a rounded heel .
- Incidence of PDPH is high.

THE GREENE NEEDLE:

- Spinal needle with a small hub and a luer-lok connector with rounded **non cutting** edges to the bevel .
- Bevel is of medium length and needle functions as a **type of pencil point needle.**
- Due to non cutting edge it separates rather than cuts the dural fibers.
- Low incidence of PDPH.

THE WHITACRE NEEDLE:

- Spinal needle with a small hub with luer-lok connector.
- The point of the needle is tapered to a sharp **"pencil point" type** of bevel.
- It is completely rounded , non cutting and solid
- The **orifice of** the needle is or one side of the cannula about **2.5 mm proximal** to the tip of the cannula which counts for more failure rate .

WHITACRE SPINAL NEEDLE

THE SPROTTE NEEDLE

- A pencil point type of spinal needle with non cutting bevel with a circular opening with lesser incidence of PDPH.

THE TUOHYS NEEDLE

- A standard directional spinal needle used to direct catheters into arachnoid and epidural space for continuous administration of local anaesthetics.
- Has a small hub with Luer–lok connector
- The tip is curved with bevel of medium length with cutting edges.
- Bevel is modified to face to the side and designated as 'Huber Point'.
- Size of 16 & 18G with 3-3.5 inches in length.

THE HUSTED NEEDLE

- Robert Husted modified the Huber Point of Tuohy's needle by making the head of the bevel opening smoother.

- This eliminates the cutting of tissues and reduces the incidence of shearing of epidural catheters in the continuous technique.

QUALITY OF SPINAL NEEDLE

- A needle with a "burr" at the point or with a poorly matched stylet has the potential to tear the duramater , increased leakage and contribute to more headaches.
- Greater tissue damage is caused by passage through the skin and spinous ligaments
- A non –resilient needle is also hazard for breakage, so defective needles should not be used.

The Quincke spinal needle is a beveled needle with sharp cutting edges .If correctly inserted with the bevel and sharp cutting edges parallel to the dural fibres, fewer fibres are cut than when the bevel is at right angle to the longitudinal fibers.

H.Greene advocated the use of spinal needles with a conical point and no cutting edges to the bevel so that the fibers of dura are spared and not severed. **Greene** advocated the use of small gauge needles with conical tip[17] and found that the incidence of headache was markedly reduced. In 1951, **Hart** reported on the use of Whitacre pencil point needle and found a 50% reduction in incidence of headache in surgical patients**. Haroldson** reported more than a three fold reduction in headaches using the whitacre needle in obstetric patients.

Spinal needles are available in varying size, length and tip designs. All needles have tightly fitting removable stylet that completely occludes the lumen to avoid tracking the epithelial cells into subarachnoid space.

The Quincke needle is a cutting type of spinal needle with end injection whereas the Whitacre and other pencil point needles have rounded points with side injection.

The Sprotte is a side injection needle with a long opening and has an advantage of more vigorous CSF flow compared with similar gauge needles. But however can lead to a failed block if the distal part of the opening is in subarachnoid space, but the proximal port has not transversed the dura so that the full dose of medication is not delivered.

ANGLE OF NEEDLE INSERTION

The angle at which the spinal needle is directed into the intervertbral space also plays a key role in the reduction of CSF leakage and the incidence of headaches. An upward angle of 30 degree as the approach to subdural space significantly reduced the rate of fluid leakage compared to a 60 or 90 degree approach.

The mechanics whereby the entry into subarachnoid space at an acute angle of 30 degree minimizes leakage is that an oblique tract is formed through the thick dural membrane to produce a flap-type valve that tends to seal the opening.

The Whitacre 22 gauge spinal needle has also been shown to reduce the rate of transdural fluid leakage in contrast to the same size Quincke spinal needle.

ORIENTATION OF BEVEL

If the bevel of the needle is inserted parallel to the longitudinal axis of the dural fibers, the size of opening in the dura is less whereas if the bevel is introduced perpendicular to dural fibres, the defect and leakage will be more.

TRANSDURAL LEAKAGE FACTORS

The factors which determine the size of the defect in dura and amount of longitudinal fibers damaged:

1. Size of needle
2. Type of needle
3. Orientation of bevel
4. Angle of approach to dural puncture

FACTORS RELATED TO PROCEDURE

1. Hyperflexion of the patient during spinal puncture can produce large defect and more leakage of CSF.
2. Using an introducer for advancing needle (20-26 G) produces minimal contamination of deeper structures and subarachnoid space.

MECHANISM OF PDPH

Basic mechanism is the imbalance between the CSF leakage and production. An ongoing loss and rate of loss greater compared to production. Loss of 30-50 ml is critical that can produce headache.

Fall of spinal fluid as a result of loss of CSF causes loss of water cushion for brain so that it sags in upright position and traction on pain sensitive supporting structures including blood vessels occurs.

Headache in anterior part of head occurs as a result of stimuli from superior surface of the tentorium cerebelli transmitted via fifth Cranial Nerve whereas posterior part and nuchal headache occurs from stimuli arising below tentorium cerebelli through tenth and ninth cranial nerve and the upper three cervical nerves.

In addition, a vascular component is also seen along with this headache due to vasodilatation which occurs to fill the gap produced by fluid loss. Painful stimuli arising from dilated blood vessels results in pain.

Prevention

Prevention of spinal headache can be done by 3 measures:

1. Reducing the spinal fluid leakage
2. Maintaining CSF normal volume
3. Proper care given to the patient

Recommendations to reduce the incidence of headache

a) Avoid using the word headache and allaying patients fear

b) Reducing the amount of CSF leakage by using smaller gauge size needles.

c) Adequate hydration of patients with oral fluids 2500 ml/day and parenteral fluids if needed.

d) Using Sise introducer to avoid contamination and irritation of puncture site and subarachnoid space.

e) Inserting spinal needle with bevel parallel to the longitudinal fibres of dura.

f) Encouraging early ambulation

g) Maintaining spinal fluid volume

TREATMENT OF PDPH

Treatment of PDPH involves only a few numbers of patients and uses inappropriate statistical analysis. Studies which observed the effects of treatment in PDPH failed to recognize that without treatment over 85 percent 0f PDPH will resolves in six weeks.

Aims of management of spinal headache

1) Replacing lost CSF.

2) Sealing the puncture site

3) Controlling cerebral vasodilatation

Treatment of PDPH includes

1) Positive reassurance and psychological support about recovery

2) Bed rest with head down position may be necessary.

3) Icebag application to head.

4) Adequate hydration-administration of adequate amount of oral and intravenous fluids.

5) Sedation and analgesia

-Aspirin, chloral hydrate ,sodium amytal

6) Caffeine sodium benzoate -0.5 mg IM/IV

7) CVS stimulating agents

Ephedrine 50 mg IV

Amphetamine 5-10 mg thrice daily

Ergotamine –subcutaneous 0.5 mg in 1 ml ;oral 1 mg

8) IV fluids-dextrose 50 % 5ml every 6 to 12 hours

9) Oxygen inhalation

10) Abdominal compression using tight binders to increase the CSF pressure

Psychological

It is important both from clinical and medicolegal point to discuss the possibility of headache before a procedure is carried out that has a risk of this complication. Patient should be explained about the reasons for headache,expected time course and therapeutic options available.

Supportive measures

Supportive measures includes rehydration, acetaminophen, NSAID's, opioids and antiemetic therapy will reduce the need for aggressive therapy but don't give complete pain relief.

Posture

Patients with PDPH should be asked to lie in head down position & prone position is also advocated in them as this increases the intraabdominal pressure which will get transmitted to the epidural space and relieves the headache. But prone position is not comfortable for postpartum patients. Clinical trial of prone position following dural puncture failed to show a reduction in post dural puncture headache.

Abdominal Binder

Tight abdominal binder increases the intra abdominal pressure which will get transmitted to the epidural space and decreases the headache. But tight binders are not comfortable for the patient and compromises respiration.

Pharmacological Treatment

DDAVP, ACTH

Report in 1964, identified 49 methods to treat post dural puncture headache But there was no adequate statistical analysis to support these ideas. DDAVP (Desmopressin acetate) i.m injection prior to dural puncture not decreased the incidence of PSPH. ACTH (Adrenocorticotrophic hormone) given by infusion for prevention of spinal headache but there is lack of studies to assess the effect of ACTH.

CAFFEINE

Caffeine which is a CNS stimulant & produces cerebral vasoconstriction. Available both as oral and iv formulation .Oral form is absorbed very fast and reaches its peak level in about 30 minutes. It crosses BBB and has a long t ½ about 3 to 7.5 hours which helps in less number of dosing.

Frequently mentioned work in the treatment of PDPH with caffeine is by Sechzer. He used two doses 1 or 2, 0.5 g doses of iv caffeine on subjects with established PDPH & concluded that iv caffeine is effective in treating PDPH.

DOSAGE

Recommended dose for PDPH is 300 to 500 mg of oral or iv caffeine once or twice daily. One cup of coffee contains about 50 to 100 mg of caffeine and soft drinks contains about 35-50 mg. The LD - 50 of caffeine is 150 mg/kg. However therapeutic dose may be associated with CNS toxic features and AF.

MOA

It is proposed that the caffeine acts by vasoconstriction of the dilated cerebral vessels. If cerebral vasodilatation were source of pain cerebral vasoconstriction limits this pain. Caffeine reduces the cerebral blood flow but its effect is temperory. This therapy is simple to administer compared to other therapeutic procedures like epidural blood patch.

Effects of this in PDPH seems temporary .In addition caffeine therapy is not a therapy without adverse effects and does not restore normal CSF dynamics therefore leaving the patient at serious effects of low CSF pressure.

SUMATRIPTAN

Sumatriptan used in treating the migranous headache is based on the modification of the cerebral vessel tone. It is a 5-HT1D receptor agonist which produces vasoconstriction of cerebral vessels like that of caffeine. But only few studies are available where sumatriptan was successful in the management

of PSPH. But recent controlled trials found there is no benefit in using sumatriptan in the conservative treatment of PSPH

SPECIAL THERAPEUTIC PROCEDURES

In patients with severe headache in whom the above measures fail;

A. Subarachnoid saline injection
B. Peridural saline solution injection
C. Epidural blood patch-The concept of sealing the holes in dura with blood clot was proposed first in 1960 by Gormley

Gormley used epidural blood patch found 2-3 ml of autologous blood is sufficient to relieve PSPH. However experience in large number indicate that such small volume is not sufficient. Most commonly used volume is 8-10 cc with 90 percent relief in headache 72 but recent studies showed volume more than 10 cc is needed and 12 cc or more in adults.

EPIDURAL BLOOD PATCH

HISTORY

After the observation that the bloody taps are associated with decreased incidence of headache the concept of epidural blood patch is developed. Theory behind this is that blood once introduced into in epidural space will produce a clot and occlude the hole preventing further leakage of fluid. A high rate of success and lower incidence of complications is established with the epidural

blood patch, so considered as the standard to evaluate alternative methods in treating PDPH.

CONTRAINDICATIONS

1. Presence of fever
2. Infection at the puncture site
3. Coagulopathy
4. Patient refusal

PRECAUTIONS

Patient's blood sample is sent for C&S to rule out infection

PROCEDURE

1) Patient positioned and lumbar area is aseptically prepared for the epidural puncture
2) 10 cc of venous blood is withdrawn from the antecubital vein
3) Epidural puncture was performed preferably at the site of original procedure
4) Blood is slowly injected (10 sec for 10 cc) and the needle removed
5) Patient is kept supine for one hour
6) Movement and ambulation are encouraged.

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Using radiolabelled RBC's or MRI scan several studies reported that the degree of spread of the epidural blood patch. After injection ,the blood is distributed more in caudal and cephalad direction regardless of the direction of the bevel of the Tuohy needle. The blood also spreads circumferentially around the anterior epidural space so thecal space is compressed and displaced by the blood. In addition, blood passes out through the intervertebral foramina and paravertebral space. The mean spread of 14 cc of blood is six spinal segments cephalic and three segments caudal. Compression of the subarachnoid space for the first 3hours. This presumed elevation in the intrathecal pressure explains rapid resolution in headache. Compression of thecal sac is not sustained & maintenance of the therapeutic effect is likely to be attributable to the presence of the presence of the clot eliminating the csf leak. it is observed that CSF acts as a procoagulant which acts as accelerating factor for the clotting process. At 7 to 13 hours there is a clot resolution forming a thick layer of mature clot over the dorsal part of the thecal sac.

OUTCOME

This technique has a success rate of about 70 to 98%. If carried out >24 hours after dural puncture. In cases in which an epidural blood patch fails in resolving the headache repeating the blood patch has a similar success rate.

Failure of the second patch and repeating the patch for 3rd or 4th time has reported. In presence of persistence of headache other causes should be ruled out.

COMPLICATIONS

Immediate exacerbation in symptoms and radicular pain are described and these symptoms don't persist and relieve with administering simple pain killers. Long term complications are less

CHRONIC HEADACHE

Patients may present with features of post spinal headache never having received spinal or epidural injection. A report of six cases with headache present between 1 and 20 years showed complete relief of headache following lumbar epidural blood patch. It is interesting that these headaches have been attributed to unidentified spontaneous intracranial hypotension.

EPIDURAL SALINE

Concerns are expressed in terms of potential danger of using autologous blood patch for treating of PDPH. Immediate resolution of the headache with epidural blood patch is due to compression in theca which increases the CSF pressure. An epidural administration of saline will produce the same effect and restore the normal CSF hemodynamic. As the saline is relatively sterile and inert solution epidural saline bolus or infusion appears to be an effective. Regimens advocated include:

1) 1 to 1.5 Liters of epidural Hartmann solution given over 24 hrs starting on the 1st day following spinal anaesthesia.
2) Up to 35 cc/hour of epidural saline or Hartmann solution administration for 24-48 hours following the development of headache.
3) A single 30 cc bolus of the epidural saline once patient developed headache
4) 10 to 120 cc of saline injected as bolus dose through caudal epidural space.

Epidural saline bolus or infusion in the lumbar injection increases the epidural and intrathecal pressure. Reductions in the leak will allow dural repair. But observations of pressure produced in subarachnoid and epidural space showed a large rise in epidural pressure and the consequent rise in the subarachnoid pressure maintains a differential pressure across the dura. The pressure rise is not constant & disappear within 10 minutes . Saline induce an inflammatory reaction within the epidural space promoting closure of the perforation in duramater. Histological studies demonstrated that an inflammatory reaction following administration of epidural dextran- 40. There is no reason to support that the epidural saline is likely to accelerate dural healing by a proinflammatory action than dextran-40. There are no studies available that clearly demonstrates either there is a sustained rise of CSF pressure or accelerated closure of the dural perforation after the administering epidural saline.

EPIDURAL, INTRATHECAL & PARENTERAL OPIOIDS

Many authors advocates the use of epidural, intrathecal & parenteral morphine and majority of this reports are case reports or in adequately controlled trials. Majority of studies used an epidural or intrathecal morphine as prophylaxis or in combination with an intra thecal catheter . Trials on intrathecal fentanyl given as prophylaxis found no evidence of reduction in the incidence of post-dural puncture headache after SAB with a 25G spinal needle.

FIBRIN GLUE

Alternative agents to the blood such as the fibrinous glue are proposed to repair the spinal dural hole. Cranial dural perforations are often repaired successfully by it. In case of lumbar dural puncture fibrin glue, can be placed blindly or by using CT-guided percutaneous injection. But there is risk of development of aseptic meningitis with this .

INTRATHECAL CATHETERS

After accidentally puncturing dura with tuohy's needle, it is suggested that placing a spinal catheter through this perforation would provoke an inflammatory reaction that may seal the hole.

SURGERY

Several reports are available about persistent CSF leak which are unresponsive to alternative therapies but successfully treated with surgical closure of the dural hole when used as a last resort .

REVIEW OF LITERATURE:

1. A Comparison Between Median and Paramedian approaches in developing PDPH in Orthopedic patients

In this study, Faramarz Mosaffa et al studied the occurrence of Post dural puncture headache in patients undergoing orthopedic procedures by giving sub arachnoid block by either median or paramedian approach. The Patients scheduled for orthopedic surgery under SAB between 2007 - 2008 were studied in a double-blinded randomized controlled trial. The patients were given spinal anesthesia after randomizing them into two groups either a median [n= 75] or paramedian [n = 75] approach by using 25G Crawford needle. Without premedication and all patients received 500 ml of NS IV and 4 ml of 0. 5% isobaric Marcaine 30 minutes prior to surgery in both approaches. Found incidence of PDPH in both groups with 7 [9.3%] patients in the median approach group versus 8 [10.7%] in the paramedian approach group developing typical Post dural puncture headache (*P*= 0. 875). However, a significant difference in PDPH incidence (*P* = 0. 041) was observed between females (9; 16.7%) and males (6; 6.3%).Concluded that there is no statistically significant difference between paramedian and median approaches with respect to PDPH incidence so the paramedian approach is best recommended for older patients with degenerative changes in the spine and intervertebral spaces and those in whom position for performing SAB is difficult and the incidence of headache was found to be higher in females than in males.

2.**Post dural puncture headache: a randomized prospective comparison of the 24 gauge Sprotte and the 27 gauge Quincke needles in young patients:**

Saul Wiesel et al group

This study was designed to compare the occurrence of Post dural puncture headache by using either 24 G Sprotte or the 27 G Quincke needles in patients

< 45 yrs of age who underwent subarachnoid block for surgeries other than obstetric . Patients randomly grouped to receive SAB by using either the 24 G Sprotte needle [n = 46] or 27 G Quincke Babcock needle [n = 47]. Patients were followed up till postoperative day three. Total 93 patients were finally analyzed for calculating the data. Over all occurrence of Post dural puncture headache was 14 percent [13 of 9], and no significant difference was found between Quincke [12.8%] needles and Sprotte [15.2%] spinal needle .In this study, the distribution of headache severity was similar in both groups . Among 13 patients who developed headache ,of them required an epidural blood patch for symptom relief . Finally concluded that both Sprotte spinal needle and the Quincke spinal needles is easy to use and required the same number of attempts in order to locate cerebrospinal fluid [first attempt successful: 73.9% versus 66%] .The results of this study concluded the occurrence of headache after SAB is same in either needle groups .

3.. **Meta analyses on PDPH and design of spinal needle**

Halpern S[1], et al

Large number of attempts are done to decrease the occurrence of PDPH after SAB by altering design & size of spinal needle. This study was done to find out whether these change in the design & size of spinal needle are effective in reducing PDPH & whether they influenze the occurrence of back pain & failed blocks. Literature were thoroughly searched for studies which compared cutting with non cutting spinal needles and smaller with larger spinal needles. Total 450 articles were searched by computerized search strategies which included 31 abstracts, twenty five correspondence, forty four original articles, and twelve reviews . Concluded that there was decrease in occurrence of PDPH while using non cutting spinal needles rather cutting spinal needles [$P < 0.05$] unless the difference in needle size varies lot. Also there is decrease in incidence of PDPH by using small spinal needle when compared with a larger spinal needle of the same type [$P < 0.05$] but no statistically significant difference in the occurrence of back pain & failed blocks. This study reported that non cutting spinal needle must be used in patients with increased risk for headache & smallest gauge spinal needle must be used in patients.

4. PDPH an old problem & new concepts: a review article about predisposing factors:

AliJabbari, et al

PDPH is a well recognized complication of subarachnoid block due to puncture of dura & arachnoid and which has a significant bearing on patient postop well being. An observational study done, Babol university of medical Sciences which reviewed literatures on present concepts about occurance , risk factor & predisposing factors affecting post dural puncture headache [PDPH]. Occurance of PDPH after SAB varies from 0.1 to 36 percent , but it is about 3.1 percent with pencil point needle 25G Whitacre. The 25Gauge QB needle with cutting bevel is popular and widely used and incidence of PDPH is 25 percent but by 25Gauge QB needle it is 17.3 percent in this study . Associated risk factors such as female sex, young patients, low BMI, multiple puncture attempts, pregnancy , inexpert operators and past history of chronic headache will increase PDPH . So the identifying factors which predispose to PDPH are important so that measures can be taken to decrease the incidence following spinal anesthesia.

5. PSPH in young and elderly patients. Two randomized, double-blind studies that compare 20 and 25G needle

Rasmussen BS et al

Two randomized double-blinded study conducted among elderly & young patients, in age group ranging from 21 to 88 yrs with a mean age of 68.9 in elderly & mean age 29.4 [range 20-40] years in young patients, compared the occurrence of PDPH based on needle size. The 2 groups who received spinal anaesthesia by either 20G or 25G, showed no significant difference regarding number, sex , age and surgery type. The occurrence of PSPH in young was 27.6 percent when a 20G spinal needle was used & 12.6 percent with 25G spinal needle. But there was no statistically significant difference in occurrence of PDPH among elderly [10.8 percent & 7.8 percent] or between the sexes. Finally this study concluded that the variation in the size of needle does not affect much in the occurrence of PDPH in elderly where as fine needles preferred in young patients.

6. The influence of Menstrual cycle in post spinal puncture headache.

Echevarria M et al

A study done to analyze the effect of the menstrual cycle on the occurrence of PSPH. 160 female patients who received SAB having regular menstruation were studied. The patients were grouped as period A [peri menstrual] andperiod B [post menstrual]. The relationship of PDPH with lifestyle habits,

and anesthetic technique, levels of female sex hormones were compared with control group. Seven cases of PDPH that is 4.3% was observed 1 among peri menstrual & while 6 among post menstrual group . Statistically no differences were observed between the two group's. As per this study there is no influence of hormone level & menstrual cycle in developing PDPH although larger number of studied are required to prove this result .

7. Post spinal puncture headache after spinal anaesthesia for caesarean section: a comparison of 25 g Quincke, 27 g Quincke and 27 g Whitacre spinal needles.

Shaikh JM et al

This Study compared the incidence & severity of PDPH in pregnant ladies by using 25G QB, 27G QB & 27G Whitacre needles. Randomized double-blinded study was done Liaquat University Hospital Hyderabad [Oct 2005 to Dec 2006] . Patients were divided into 3 groups which included 480 patients of ASA I&II in full term pregnancy in the age group of 18 - 45 years underwent elective LSCS under SAB 1) Group 1 [25G QB needle: n=168] 2) Group2 I[(27G QB needle: n=160] & 3)Group 3 [27G Whitacre needle: n=152]. SAB done by using1.5-2.0 cc 0.75% H bupivacaine with 25Gauge QB needle [Group 1], 27Gauge QB spinal needle [Group 2] & 27Gauge W spinal needle[Group 3] at L3-L4 interspace. The patients were assessed daily for 4 consecutive days after surgery. Data's were collected & analyzed regarding

severity &frequency of PSPH by SPSS-11. Incidence of PSPH with 25G QB needle [Group 1], 27G QB needle [Group 2] & 27G Whitacre needle

[Group 3] spinal needles was 8.3 percent[14/168], 3.8 percent [6/160] & 2.0 percent [3/152] . In Group 1, PSPH was mild in 5 patients, moderate in 7 & severe in 2 patients . In Group, 2 was mild in 2, moderate in 3 &severe in 1 patient. In group 3, it was mild in 2 and moderate in 1 patient. Severe PDPH not occurred in Group 3. Most patients developed PSPH on 1st & 2nd postop day. With 27G W spinal needle, the incidence,severity of PSPH was reduced significantly lower when compared to 25G QB & 27G QB needle.

8. Comparison of 27-gauge (0.41-mm) Whitacre and Quincke spinal needles with respect to post-Dural puncture headache and non-dural puncture headache

Santanen U et al

Incidence of headache after SAB has varied greatly between studies. This study compared the frequency of headache in general & PSPH with 27 G

[ID-0.41 mm] QB &W needles in patients for ambulatory surgery with SAB. A Prospective randomized controlled study among 676 ASA physical status I to II op patients with SAB by either 27-G [0.41 mm]QB or 27-G [0.41 mm] W needle. Occurance of any type of post op headache was assessed & the type defined with standard questionnaire including PSPH criteria. Severity was assessed by 100-mm visual analogue scale [VAS]. Final analysis done among 529 patients [259 in QB group &270 in Whitacre group]. Total occurrence of

postop headache - 20.0% but was very low [1.51%]. Theoccurrence of PSPH in the QB group - 2.70 percent while in Whitacre group - 0.37percent [P < 0.05]. The total incidence of non-Dural puncture headache was 18.5 percent & not differs between the study groups. True PSPH seldom occurs when a 27-G [0.41 mm] spinal needle is used although postoperatively a non-specific headache is common. Using 27-G [0.41 mm] Whitacre needle further decreased the occurrence of PSPH. In this study, recommended use of 27-G [0.41 mm]W needle for performing SAB.

9. Postdural puncture headache after spinal anaesthesia in young orthopedic outpatients using 27-g needles.

Despond O1et al

Two large studies done reported very low rate of about 0.5-1.8% of PDPH using 27G needle & suspected it is higher among young ambulatory patients. The aim of this study was to establish the rate of PDPH in such group using 2 types of needles. Total 200 patients including male & female of 18 to 45 yrs age group who underwent knee arthroscopy by SAB were randomly assigned to receive SAB with lignocaine 5% using either a QB or W 27G needle.Twenty patients choosing GA formed a comparative group. By a validated questionnaire , the occurrence& nature of PSPH were evaluated by telephone 3 to 5 days after surgery by another anaesthetist unaware of technique used. All data collected & an anaesthetist not involved in the study determined in a blind fashion which headaches were likely to be PSPH. Overall occurrence of PSPH in both groups was 9.3 percent. The occurrence among women was 20.4

percent higher than in men, 5.5%, ($P < 0.05$). One patient required epidural patch. Both type of needle gave comparable results in this study . Rate of PSPH wasmore than other studies with 27-G QB and W spinal needles & more among females than males.

10. Bevel direction, dura geometry, and hole size in membrane puncture: laboratory report.

Kempen PMMocek CK

The cylindrical shape of the dura as well as the needle tip deviation known to occur with beveled needle insertion,might predispose to geometric effects of needle orientation on hole size and shape during dural puncture. The object of this study was to investigate such possible effects. Standard xerographic paper was used to simulate a dura mater membrane with random fiber orientation. Rigidly mounted paper cylinders of 2-cm diameter were transfixed at 90 degrees angles to the cylinder axis with 22-gauge Quincke point spinal needles. A non rotating drill press effected linear insertion, creating entry and exit perforations at median and paramedian positions. The bevel direction was rotated at 90 degrees angles during punctures in order to determine the effects of lateral versus transverse bevel orientation (relative to the cylinder axis) on the resultant hole morphology .With median perforation, all holes (entry and exit) were of uniform size and shape regardless of bevel orientation. Paramedian perforations of the cylinder at near tangential positions, with the bevel directed lateral to the cylinder axis, resulted in formation of a flap

overlapping the margins of either the entry or exit hole but not both. Flaps formed only when the bevel faced the cylinder membrane's surface during paramedian, near tangential puncture (n = 10, P = .00001). The geometric interactions of membranes with Quincke needles lend support to the practice of needle insertion with the bevel facing laterally in order to produce smaller holes. Geometry may help to explain the reduced rate of postdural puncture headache found with Quincke bevels oriented to face laterally during midline approach and during paramedian technique, particularly when a single puncture results in aspiration.

11. Postdural puncture headache after spinal anaesthesia in young orthopaedic outpatients using 27-g needles.

Despond O et al

Two large studies reported a very low rate (0.5-1.8%) of postdural puncture headache (PDPH) with the use of 27G spinal needles. We suspected that it might be higher in young ambulatory patients. The purpose of this study was to establish the rate prospectively in such a patient population using two types of needles. Two hundred male and female, outpatients, 18-45 yr, undergoing knee arthroscopy under spinal anaesthesia were randomly assigned to receive spinal anaesthesia with hyperbaric lidocaine 5% using either a Quincke or a Whitacre 27G needle. Twenty patients choosing general anaesthesia formed a comparative group. Using a previously validated questionnaire, the incidence and nature of PDPH were evaluated by telephone three to five days after

surgery by an anaesthetist unaware of the anaesthetic technique used. Once all data were collected, an anaesthetist not involved in the study determined in a blinded fashion which headaches were likely to be PDPH. Grading and classification of headaches were based on several criteria: postural nature, duration, intensity and confinement to bed. The overall incidence of PDPH in both spinal groups was 9.3%. The incidence in women, 20.4%, was higher than in men, 5.5%, ($P < 0.05$). Only one patient required a blood patch. Both types of needle were comparable with respect to the incidence, severity and duration of PDPH, number of dural punctures and failed spinal blocks. The rate of PDPH was higher than in large published studies with 27G Quincke and Whitacre needles and greater in women than in men.

METHODOLOGY

This study was designed to find out the incidence of Post dural puncture headache in patients of age group 18-45 years posted for lower abdominal and lower limb surgeries using 25G Quincke and 25G Whitacre spinal needle.

SOURCE OF DATA

After Ethical Committee clearance and obtaining informed written consent from the patient. 100 patients of ASA 1 and 2 of age group 18-45 years posted for lower abdominal and lower limb surgeries in Government Mohan Kumaramangalam Medical college in the Study period were included Study population was divided into 2 groups :

GROUP 1 - Patients who received spinal anesthesia with 25G Quincke needle

GROUP 2 - Patients who received spinal anesthesia with 25G Whitacre needle

STUDY DESIGN

- A Prospective randomized double blinded controlled study was done

INCLUSION CRITERIA

- 100 patients of American Society of Anesthesiologists Class 1 and 2 of age group 18-45 years posted for lower abdominal and lower limb surgeries

EXCLUSION CRITERIA

- Patient refusal
- Patient with neurological deficit & spinal cord deformities,
- Psychological illness,
- Grossly obese hypovolemic or hypertensive patients
- Patients sustaining more than one prick
- Patients with prior headache
- LSCS
- Local Sepsis
- Bleeding disorders or Coagulopathies

METHOD OF STUDY

- Thorough and detailed history of present and past medical illness were taken
- Past history of anesthetic exposure with concomitant history of drugs taken in the pre -operative period.
- Routine investigations including coagulation profile done
- General and systemic examination done
- All procedures performed in sitting position by the same anaesthesiologist
- Back of patient cleaned with povidone iodine and spirit and draped with sterile towels

- Spinal anesthesia was performed using midline approach at L2-L3 or L3-L4 using one of the above needles and 0.5 % of 2-3ml Bupivacaine was injected and patient turned to supine position.

- Level of sensory blockade and changes in parameters like heart rate and BP will be recorded

- Solution of Ringer Lactate ,colloid and blood transfused according to loss.

- Hypotension treated with Injection ephedrine 6 mg IV

Complication like nausea, vomiting, bradycardia and respiratory depression were managed symptomatically

- Different anesthesiologists not knowing the type of needle used did post operative observations

- Patients were interviewed day 1,2,3,4 and 5 and were questioned regarding headache, its severity, location character, duration and associated symptoms like nausea, vomiting, auditory and ocular symptoms

- **CRITERIA FOR PDPH**

1. Occurred after mobilization.
2. Aggravated by erect or sitting position and coughing, sneezing or straining.
3. Relieved by lying flat.
4. Mostly localized in occipital, frontal or generalized.

SEVERITY OF HEADACHE was assessed with standard Scale

(Numerical Analogue Scale)

1. Mild headache (while sitting or ambulant)

2. Moderate headache(sitting position)

3. Severe headache(when supine)

- Mild to moderate headache treated with bedrest, adequate hydration, IV fluids, and analgesics like aspirin, codeine or caffeine.
- Severe headache requires treatment with epidural blood patch in addition to above measures.

Other types of headache will be excluded from study.

RESULTS

A total of 100 patients admitted for lower limb and lower abdominal surgeries were included in the study as per inclusion and exclusion criterias. The study groups were divided into two groups based on the type of spinal needle used.

TABLE 1:

DISTRIBUTION OF STUDY GROUP BASED ON SEX

Sex	Frequency	Percent
Male	51	51
Female	49	49
Total	100	100

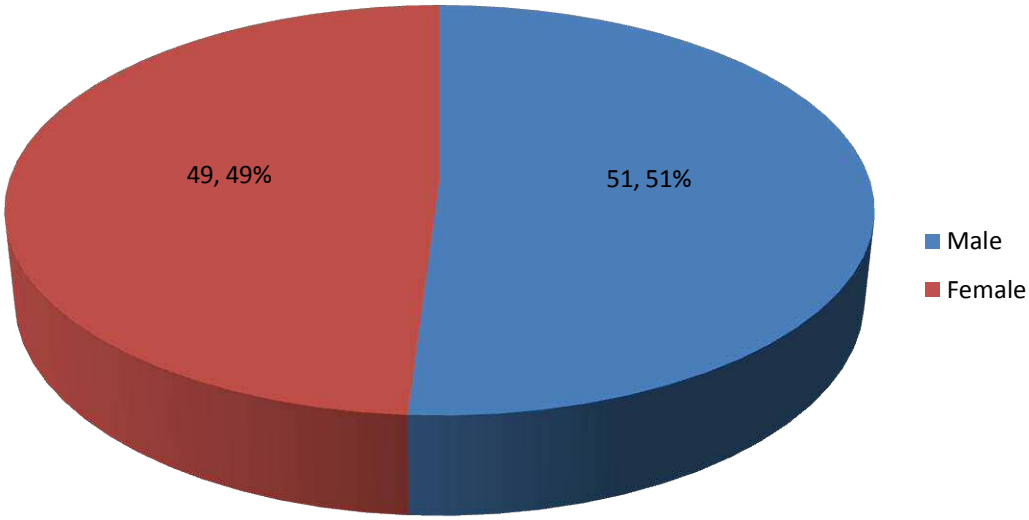

TABLE 2:

DISTRIBUTION OF STUDY GROUP BASED ON THE TYPE OF SURGERY

Type of surgery	Frequency	Percent
Lower Abdominal	31	31
Lower Limb	69	69
Total	100	100

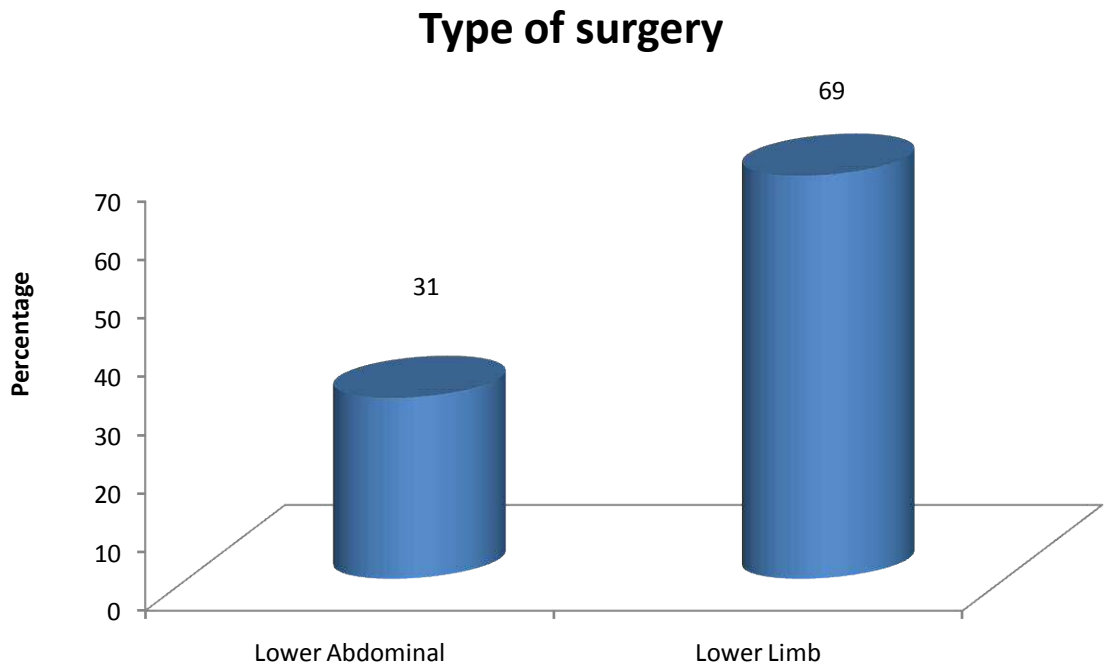

TABLE 3:

DISTRIBUTION OF STUDY GROUP ACCORDING TO TYPE OF SPINAL NEEDLE

Type of needle	Frequency	Percent
Quincke	50	50
Whitacre	50	50
Total	100	100

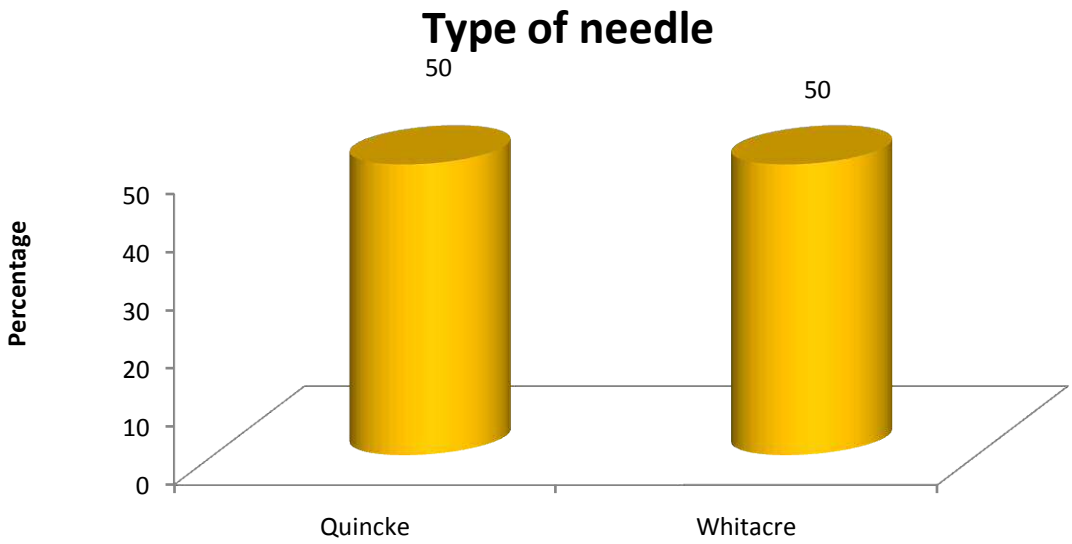

TABLE 4:

DISTRIBUTION ACCORDING TO VOLUME OF THE DRUG USED:

Volume of drug	Frequency	Percent
2.50	39	39
3.00	61	61
Total	100	100

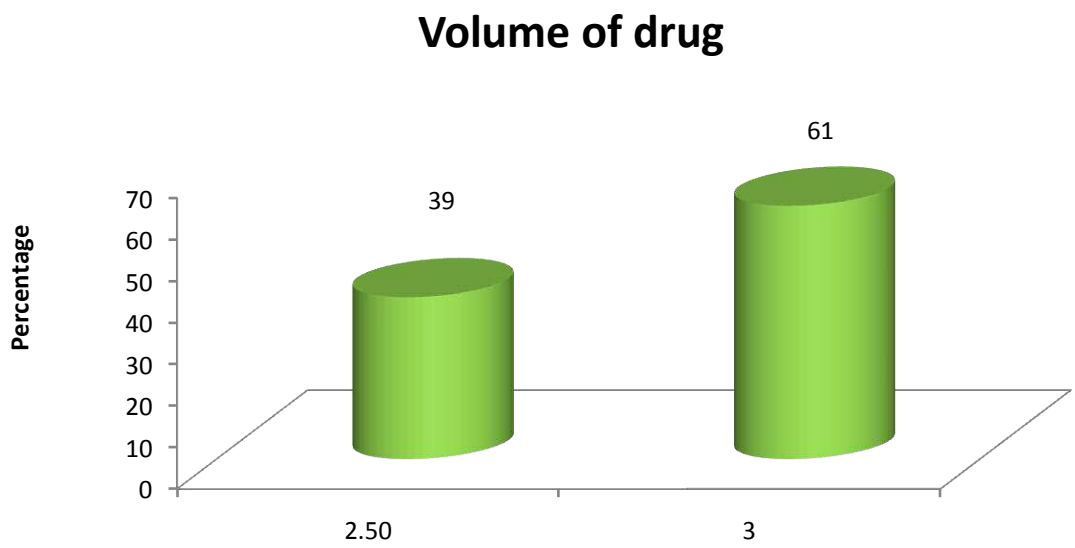

TABLE 5:

DISTRIBUTION ACCORDING TO THE FREQUENCY OF HEADACHE:

Headache (P/A)	Frequency	Percent
Absent	92	92
Present	8	8
Total	100	100

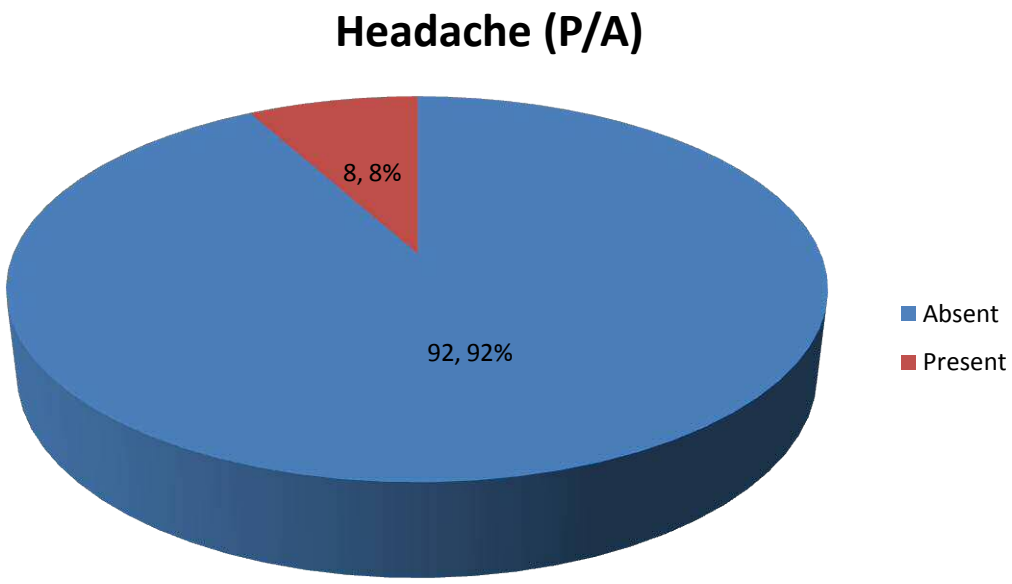

TABLE 6:

DISTRIBUTION OF MALE- FEMALE SEX BASED ON SPINAL NEEDLE TYPE:

Sex	Type of needle				Total
	Quincke		Whitacre		
	N	%	N	%	
Male	27	52.94	24	47.06	51
Female	23	46.94	26	53.06	49
Total	50	50	50	50	100

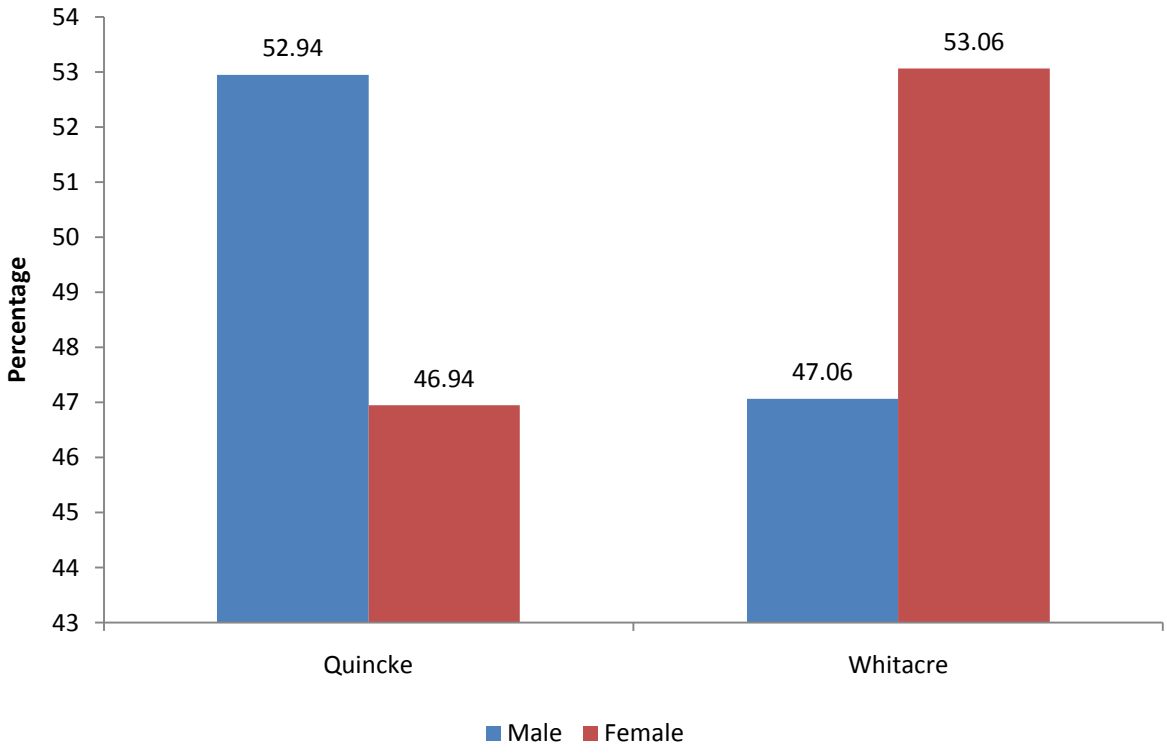

TABLE 7:

DISTRIBUTION OF SPINAL NEEDLE ACCORDING TO THE TYPE OF SURGERY:

Type of surgery	Type of needle				Total
	Quincke		whitacre		
	N	%	N	%	
Lower Abdominal	25	80.65	6	19.35	31
Lower Limb	25	36.23	44	63.77	69
Total	50	50	50	50	100

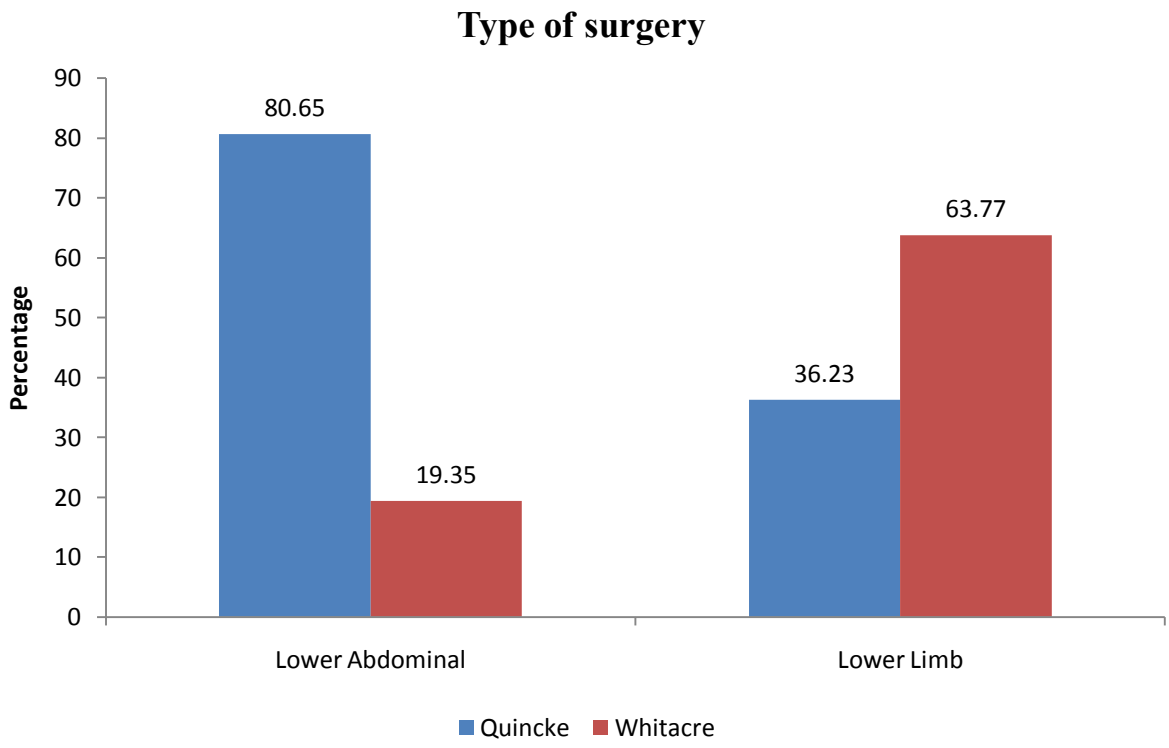

TABLE 8:

FREQUENCY OF HEADACHE DEPENDING ON TYPE OF NEEDLE:

Headache (p/a)	Type of needle				Total
	Quincke		whitacre		
	N	%	N	%	
Absent	43	86	49	53.26	92
Present	7	14	1	12.50	8
Total	50	50	50	50	100

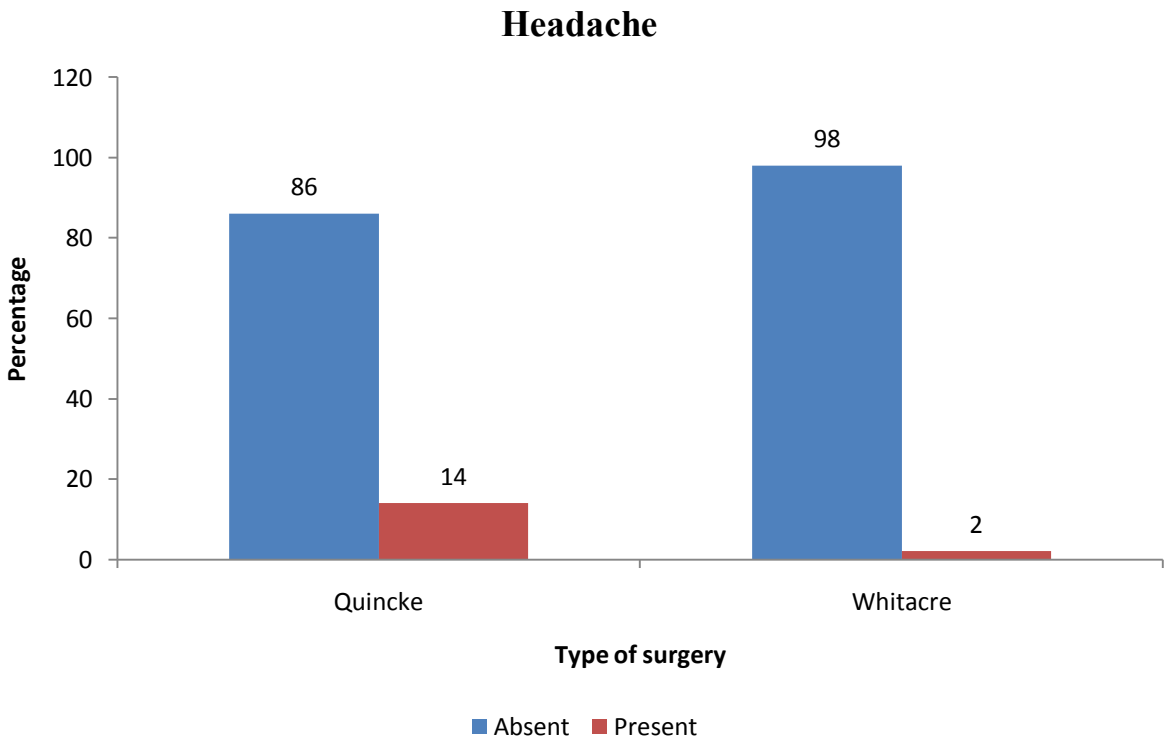

TABLE 9:

DISTRIBUTION OF STUDY GROUP BASED ON SEX:

Sex	Type of surgery				Total
	Lower Abdominal		Lower Limb		
	N	%	N	%	
Male	12	23.53	39	76.47	51
Female	19	38.78	30	61.22	49
Total	31	31	69	69	100

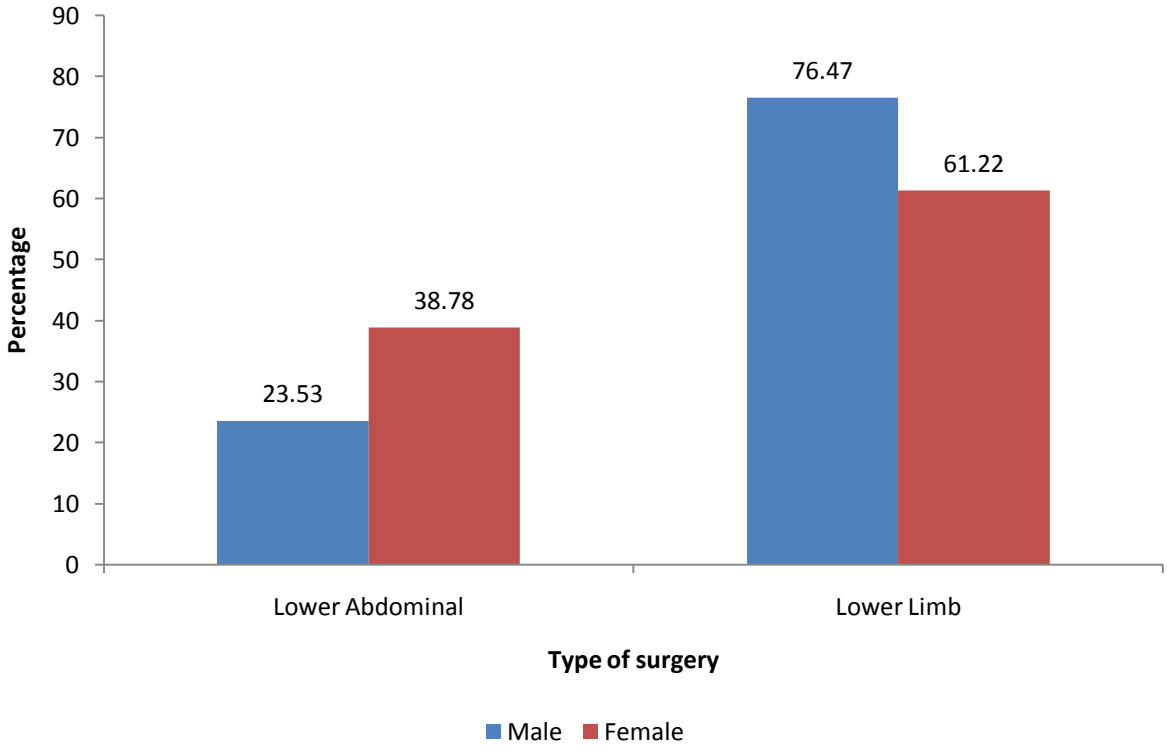

TABLE 10:

COST FACTORS OF NEEDLE

	Minimum	**Maximum**	**Mean**	**SD**
Age	18	48	32.20	8.28
Cost of needle	70	140	104.30	35.17
Weight	40	75	57.61	8.27
Volume of drug	2.50	3.00	2.81	0.25

TABLE 11:

STATISTICAL ANALYSIS OF HEADACHE BASED ON SEX

Sex	Headache				Total	Chi square	P
	Absent		**Present**				
	N	**%**	**N**	**%**			
Male	50	98.04	1.00	1.96	51	5.16	0.023
Female	42	85.71	7.00	14.29	49		
Total	92	92.00	8	8.00	100		

*Significant at 5 %

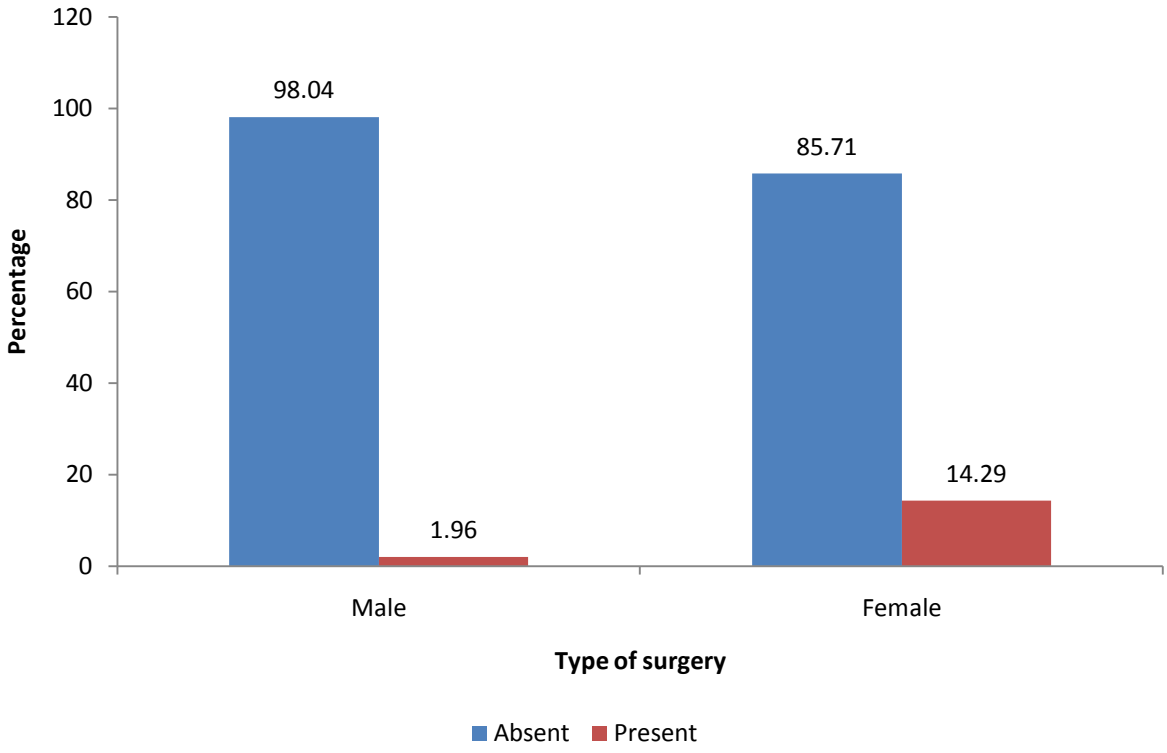

TABLE 12:

RELATIONSHIP BETWEEN HEADACHE AND TYPE OF SURGERY

Type of surgery	Headache				Total	Chi square	p
	Absent		Present				
	N	%	N	%			
Lower Abdominal	25	80.65	6.00	19.35	31	7.87	0.005**
Lower Limb	67	97.10	2.00	2.90	69		
Total	92	92.00	8	8.00	100		

**Significant at 1 %

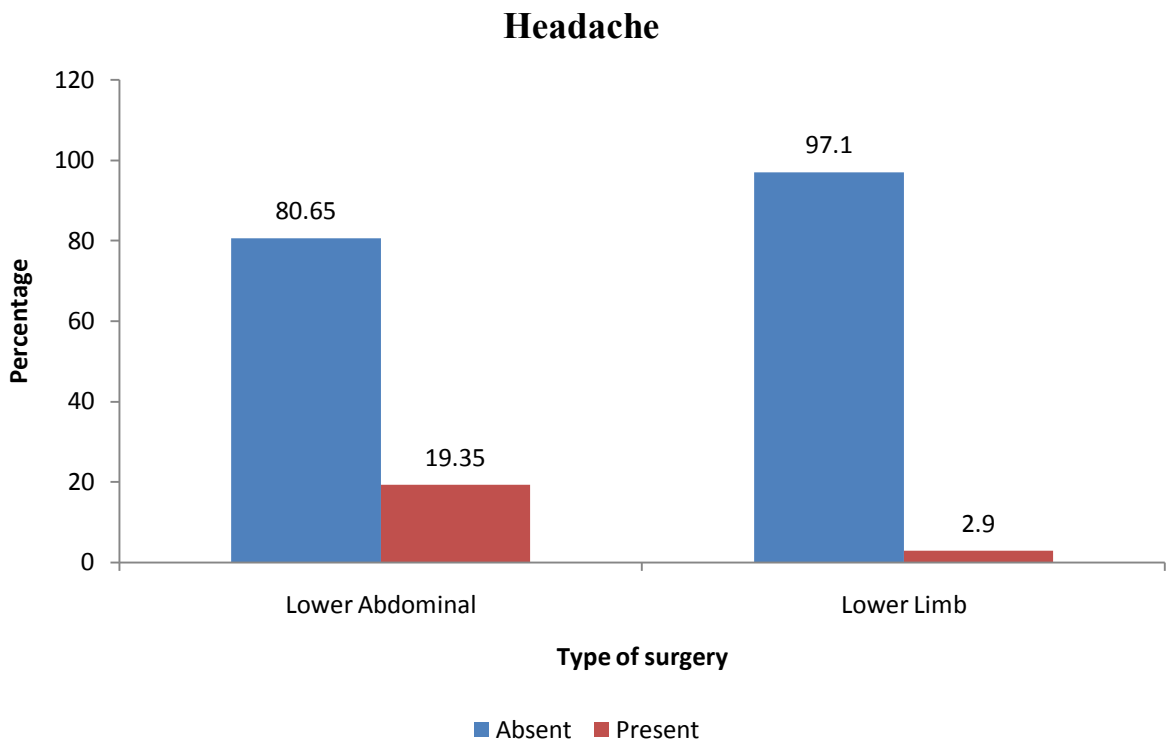

TABLE 13:

STATISTICAL RELATIONSHIP BETWEEN TYPE OF NEEDLE AND INCIDENCE OF HEADACHE

Type of needle	Headache				Total	Chi square	p
	Absent		Present				
	N	%	N	%			
Quincke	43	86.00	7.00	14.00	50	4.89	0.027*
Whitacre	49	98.00	1.00	2.00	50		
Total	92	92.00	8	8.00	100		

*Significant at 5 %

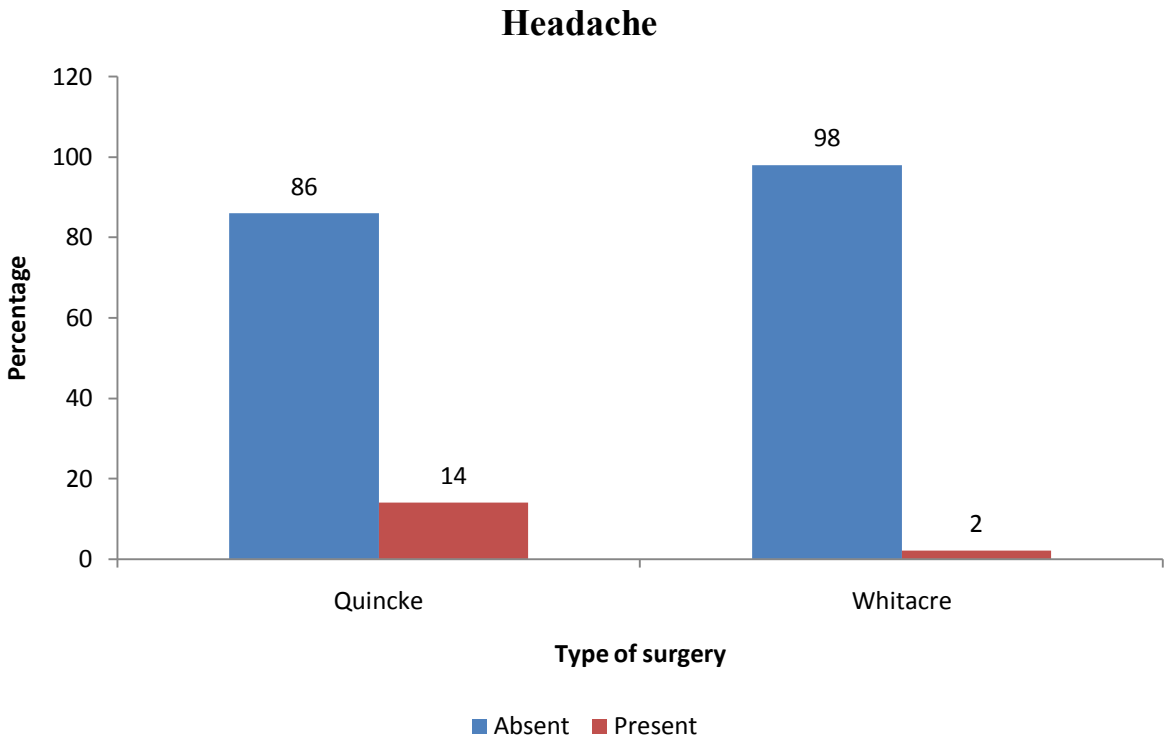

TABLE 14:

RELATION BETWEEN AGE, WEIGHT AND VOLUME OF DRUG WITH HEADACHE

	Headache (p/a)	**N**	**Mean**	**SD**	**t**	**p**
Age	Absent	92	32.68	8.43	2.02	0.046*
	Present	8	26.63	2.56		
Weight	Absent	92	58.13	8.27	2.17	0.032*
	Present	8	51.63	5.85		
Volume of drug	Absent	92	2.80	0.25	0.09	0.929
	Present	8	2.81	0.26		

*Significant at 5 %

DISCUSSION

Regional anaesthesia particularly spinal anaesthesia has developed a lot since its introduction in the late 1800's. Spinal Anaesthesia is considered now as a superior choice in the regional anaesthesia. It is safe, reliable technique & cost effective. Spinal anaesthesia like other techniques is also associated with complications along with advantages. Post-dural spinal headache (PDPH) is important complication of this. Incidence of PDPH depends upon number of variables such as age of patient, sex, size, type &orientation of needle and the type of surgery performed. The frequency of PDPH ranges from 0% to 36% .

In our study 8 patients out of 100 (16.5%) developed headache. Among this 7 (14%) patients belonged to quincke group and 1 (2%) belonged to whitacre group. Study done by Malik et al found out the incidence of PDPH was 5 percent with 25 G Quincke Babcock spinal needle when used for lower abdominal & perineal surgeries.

Large spinal needles will produce bigger defects in dura so chance of dural puncture headache is more in comparison with smaller needles which produce small dural defects & less incidence of headache[17]. This large bore needle was associated with an incidence of 70 percent whereas advanced small size needles are less likely to produce higher incidence. In a study done by Weasel observed 12.8% incidence in pregnant patients when 27G Quincke needle was used [19]. The gauge of the needle was kept constant in this study. In our study we kept gauge size same.

The type of the needle used is loved factor and major determinant for PDPH . For 25G Quincke, incidence ranges from 3-25 percent while it is 0-14.5 percent for Whitacre needle of the same size. The reported results in the two groups are comparable with our study i.e. 14 % for 25G Quincke Babcock needle and 2 % for 25G Whitacre needle.

Vallejo study on 1002 women undergoing elective cesarean spinal LSCS anaesthesia with different types of needle. The frequency of headache was 8.7% for 25G Quincke & 3.1% for Whitacre needle of same size[20].

Mayer et.al in his study used 27G quincke spinal needle found there is no statistically significant difference between Quincke and Sprotte spinal needles[21]. But study showed major reduction in headache when Whitacre spinal needle used.

Number of puncture attempts can be reduced by the experience of the anaesthetist. Experienced anaesthetist is likely to introduce needle in the subarachnoid space in fewer attempts. Spinal anaesthetic was delivered to all the patients included in our study by same anaesthesiologist in single puncture attempt.

Apart from pregnancy, higher rates of PDPH seen in young and especially females. Wadud recorded 30% occurrence in young individuals [30-50 yrs] and higher percentage [40%] in females compared with males [20%]. In our study higher incidence of headache as among females [14.29%] compared to males [1.96%][23.]

Treatment options for Post dural puncture headache includes simple measures such as adequate hydration, NSAID'S to complex procedures as epidural blood patch. Simple measures are very effective in managing most cases of PDPH. In our study NSAID's hydration & adequate rest relieved headache in patients.

CONCLUSION

PDPH is not a rare complication. There is statistically significant difference in the development of PDPH when pencil point spinal needles like Whitacre than cutting spinal needles like Quincke needles are used . Pencil point needles are associated with a lesser frequency of post-dural puncture headache as compared to cutting needles of the same gauge. Headache was more among young females compared to males.

SUMMARY:

PDPH is post spinal sequel of spinal anaesthesia which should not be taken lightly since it can produce postoperative morbidity. In majority ,the problem will settle spontaneously but in some the headache will last for months and years. Therapies which are offered for treatment of PDPH is not always arisen by the application of logic & reasoning. Gormley's observation that bloody taps are less likely associated with headache probably incorrect had led to the widespread application of epidural blood patching in the treatment of post-dural spinal headache. The benefit of prophylatic blood patching is not that clear but deserves importance in those at increased risk of headache such as a parturient after accidental dural puncture by Tuohys needle but there are occasions in which blood patches are not effective in treatment of headache. It is always important to consider other causes of headache before application of alternative therapies for PDPH.

In our study, we concluded that non cutting needle like 25 gauge whitacre produces a statistically significant difference ($p<0.05$) of incidence of post dural puncture headache than cutting spinal needle like 25 gauge quincke needle.

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PROFORMA

Name :

Age:

Sex:

Ip no:

Type of surgery:

Premedication:

Type of needle used:

Volume of drug used:

Cost of needle:

Headache: Present/Absent:

Onset and duration of headach;,if present:

Severity of headache; Mild,Moderate,Severe:

Associated symptoms; If present-

CONSENT

"POST DURAL PUNCTURE HEADACHE IN LOWER LIMB AND LOWER ABDOMINAL SURGERIES –A COMPARATIVE STUDY BETWEEN 25 G QUINCKE AND 25 G WHITACRE SPINAL NEEDLES.

DEPARTMENT OF ANAESTHESIOLOGY, GMKMCH SALEM

PARTICIPANT NAME: AGE: SEX:

I.P. NO:

I confirm that I have understood the purpose of the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the possible complications that may occur during and after medical procedure. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

I hereby consent to participate in this study.

Time: Patient name:

Date: Signature / Thumb Impression of Patient:

Place Name and signature of the Investigator:

S NO.	NAME	AGE	SEX	WEIGHT	TYPE OF SURGERY	TYPE OF NEEDLE	COST OF NEEDLE	VOLUME OF DRUG	HEADACHE (P/A)	ONSET	ASSOCIATED SYMPTOMS	GRADING OF HEADACHE
												MILD MODERATE SEVERE
1	Kumar	45 yrs	Male	65 kg	LA	Quincke	70 rs	3 ML	absent	NA	NA	NA
2	Thangavel	30 yrs	male	60 kg	LL	Quincke	70 rs	2.5 ML	absent	NA	NA	NA
3	saraswathi	27 yrs	female	55kg	LA	Quincke	70 rs	3ML	present	2-4 days	N & V	Moderate
4	aravindkumar	19 yrs	male	45 kg	LA	Quincke	70 rs	2.5 ML	absent	NA	NA	NA
5	chinnapayan	45yrs	male	69 kg	LA	Quincke	70 rs	3 ML	absent	NA	NA	NA
6	ramasamy	24 yrs	male	54 kg	LA	Quincke	70 rs	2.5 ML	absent	NA	NA	NA
7	murugasen	40 yrs	male	71 kg	LA	Quincke	70 rs	2.5 ML	absent	NA	NA	NA
8	prabhu	25 yrs	male	57 kg	LA	Quincke	70 rs	3 ML	absent	NA	NA	NA
9	vinitha	29 yrs	female	46 kg	LA	Quincke	70 rs	2.5 ML	present	2-4 days	N & V	Moderate
10	gandhi	34 yrs	male	58kg	LA	Quincke	70 rs	2.5 ML	absent	NA	NA	NA
11	Mohan	40 yrs	male	70 KG	LA	Quincke	70 rs	3 ml	absent	NA	NA	NA
12	elangovan	29 yrs	male	50 Kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
13	sreenivasan	40 yrs	male	66 kg	LA	Quincke	70 rs	3ml	absent	NA	NA	NA
14	ajithkumar	18 yrs	male	40 kg	LA	Quincke	70 rs	2.5 ml	absent	NA	NA	NA
15	muthusamy	41 yrs	male	57 kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
16	sekhar	43 yrs	male	66 kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
17	rahul	25 yrs	male	51 kg	LA	Quincke	70 rs	2.5 ml	present	2-4 days	NIL	Mild
18	sharmila	44 yrs	female	68 kg	LL	Quincke	70 rs	3 ml	absent	NA	NA	NA
19	vijay	19 yrs	male	50 kg	LL	Quincke	70 rs	2.5 ml	absent	NA	NA	NA
20	rabeeq	23 yrs	male	55 kg	LL	Quincke	70 rs	2.5 ml	absent	NA	NA	NA
21	yoganath	22 yrs	male	60 kg	LL	Quincke	70 rs	2.5 ml	absent	NA	NA	NA
22	murugasen	39 yrs	male	65 kg	LL	Quincke	70 rs	3 ml	absent	NA	NA	NA
23	venugopal	26 yrs	male	55 kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
24	divya	20 yrs	male	45 kg	LL	whitacre	70 rs	3ml	absent	NA	NA	NA
25	raja	35 yrs	male	60 kg	LL	Quincke	70 rs	3 ml	absent	NA	NA	NA
26	mariyammal	31 yrs	female	47 kg	LL	whitacre	140 rs	3 ml	absent	NA	NA	NA
27	jayasarnkar	33 yrs	Male	63 kg	LL	whitacre	140 rs	3ml	absent	NA	NA	NA
28	sugunan	42 yrs	Male	65kg	LL	whitacre	140 rs	3ml	absent	NA	NA	NA
29	sumithra	27 yrs	female	58 kg	LA	Quincke	70 rs	3ml	absent	NA	NA	NA
30	madhesh	48 yrs	Male	73 kg	LL	whitacre	140 rs	3ml	absent	NA	NA	NA
31	veeraraj	23 yrs	Male	60 kg	LL	whitacre	140rs	2.8 ml	absent	NA	NA	NA
32	karunakaran	45 yrs	Male	55 kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
33	vichitra	22 yrs	female	40 kg	LA	Quincke	70 rs	2.5 ml	absent	NA	NA	NA
34	vijaya	44 yrs	Male	48 kg	LL	Quincke	70rs	3ml	absent	NA	NA	NA
35	ramasamy	45 yrs	Male	61 kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
36	saravanan	23 yrs	Male	56 kg	LL	whitacre	140 rs	2.5ml	present	2-4 DAYS	Nausea	Mild
37	vasanthi	32 yrs	female	63 kg	LA	Quincke	70 rs	3ml	absent	NA	NA	NA
38	usha	23 yrs	female	46 kg	LA	Quincke	70rs	2.8ml	absent	NA	NA	NA

39	lakshmi	42 yrs	female	60kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
S NO.	NAME	AGE	SEX	WEIGHT	TYPE OF SURGERY	TYPE OF NEEDLE	COST OF NEEDLE	VOLUME OF DRUG	HEADACHE (P/A)	ONSET	ASSOCIATED SYMPTOMS	GRADING OF HEADACHE
40	palanisamy	43 yrs	Male	66 kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
41	mustafa	40yrs	Male	54kg	LL	whitacre	140 rs	2.6 ml	absent	NA	NA	NA
42	raji	30yrs	Male	60kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
43	loganathan	30yrs	Male	59kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
44	mani	21 yrs	Male	56kg	LL	Quincke	70rs	3ml	absent	NA	NA	NA
45	sundhari	23 yrs	female	40kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
46	jayakumar	40 yrs	Male	60kg	LL	whitacre	140rs	2.5ml	absent	NA	NA	NA
47	dhanasekhar	24 yrs	Male	56kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
48	parvathi	44yrs	female	55kg	LL	whitacre	140rs	2.5 ml	absent	NA	NA	NA
49	prabhavathi	20yrs	female	50kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
50	soundhariya	24yrs	female	55kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
51	amutha	40yrs	female	66kg	LL	whitacre	140rs	2.5ml	absent	NA	NA	NA
52	kalairasi	35yrs	female	49kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
53	seetha	39yrs	female	58kg	LL	whitacre	140rs	2.8 ml	absent	NA	NA	NA
54	valli	42yrs	female	55kg	LL	Quincke	70rs	3ml	absent	NA	NA	NA
55	subramani	35yrs	Male	64kg	LL	Quincke	70rs	3ml	present	2-4 DAYS	Nausea	Mild
56	karthick	36yrs	Male	70kg	LL	whitacre	140rs	2.6 ml	absent	NA	NA	NA
57	ravi	40yrs	Male	56kg	LL	whitacre	140rs	3 ml	absent	NA	NA	NA
58	kanimozhi	33yrs	female	54kg	LA	Quincke	70rs	2.8 ml	absent	NA	NA	NA
59	jaganath	38yrs	Male	59kg	LL	whitacre	140rs	2.6 ml	absent	NA	NA	NA
60	anjali	19yrs	female	48kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
61	keerthi	41yrs	female	60kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
62	marathakavalli	43yrs	female	48kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
63	ganesan	37yrs	Male	71kg	LL	Quincke	70rs	2.8ml	present	3-5 DAYS	Nausea	Moderate
64	jayaraman	33yrs	Male	68kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
65	kavitha	30yrs	female	55kg	LA	Quincke	70 RS	3ml	absent	NA	NA	NA
66	gomathi	38yrs	female	60kg	LA	Quincke	70 rs	3ml	present	3-5 DAYS	Vomiting	Mild
67	kumar	23yrs	Male	46kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
68	saroja	40yrs	female	68kg	LL	Quincke	70 rs	2.8ml	absent	NA	NA	NA
69	Krishnaveni	27yrs	female	55KG	LL	whitacre	140rs	3ml	absent	NA	NA	NA
70	arunachalam	41 yrs	Male	63 kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
71	marimuthu	37yrs	female	60kg	LA	Quincke	70 rs	3ml	absent	NA	NA	NA
72	vadivel	25yrs	Male	58kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
73	chinnadurai	33yrs	Male	61kg	LL	whitacre	140rs	2.8ml	absent	NA	NA	NA
74	mahendran	39yrs	Male	65kg	LL	whitacre	140rs	2.8ml	absent	NA	NA	NA
75	poongodi	25yrs	female	50kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
76	jyothi	31yrs	female	43kg	LA	Quincke	70rs	3ml	absent	NA	NA	NA
77	thenmozhi	27yrs	female	48kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA

78	mahendran	33yrs	Male	55kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
79	ravchandran	31yrs	Male	56kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
S NO.	NAME	AGE	SEX	WEIGHT	TYPE OF SURGERY	TYPE OF NEEDLE	COST OF NEEDLE	VOLUME OF DRUG	HEADACHE (P/A)	ONSET	ASSOCIATED SYMPTOMS	GRADING OF HEADACHE
81	nithya	23yrs	female	45kg	LL	Quincke	70 rs	3ml	absent	NA	NA	NA
82	meekshi	24yrs	female	47kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
83	lakshmi	40yrs	female	67kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
84	kalyani	34yrs	female	61kg	LL	whitacre	140rs	2.5ml	absent	NA	NA	NA
85	muniyammal	28yrs	female	57kg	LL	Quincke	70rs	2.5ml	absent	NA	NA	NA
86	selvi	22yrs	female	48kg	LL	Quincke	70rs	3 ml	absent	NA	NA	NA
87	kumari	20yrs	female	42kg	LA	whitacre	140rs	3ml	absent	NA	NA	NA
89	devipriya	22yrs	female	50kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
90	mohana	43yrs	female	68kg	LA	whitacre	140rs	2.6ml	absent	NA	NA	NA
91	suganya	33yrs	female	56kg	LL	Quincke	70rs	3ml	absent	NA	NA	NA
92	malliga	40yrs	female	53kg	LL	Quincke	70rs	3ml	absent	NA	NA	NA
93	revathy	22yrs	female	50kg	LA	Quincke	70rs	3ml	absent	NA	NA	NA
94	remya	24yrs	female	55kg	LL	Quincke	70rs	2.5ml	absent	NA	NA	NA
95	vijaya	28yrs	female	62kg	LL	Quincke	70rs	2.8 ml	present	2-5 DAYS	Nausea	Mild
96	poongodi	35yrs	female	58kg	LA	Quincke	70rs	3ml	absent	NA	NA	NA
97	sumathi	37yrs	female	54kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
98	akhila	41yrs	female	63kg	LA	whitacre	140rs	2.8ml	absent	NA	NA	NA
99	subathra	23yrs	female	51kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA
100	ponmani	32yrs	female	60kg	LL	whitacre	140rs	3ml	absent	NA	NA	NA